2014

MediTERRA

LOGISTICS AND AGRO-FOOD TRADE
A CHALLENGE FOR THE MEDITERRANEAN

CIHEAM

SciencesPo. Les Presses

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PREFACE

The 2014 Edition of *Mediterra* is published in a context of changing international and Mediterranean situations. The world is increasingly multipolar but this does not result in the strengthening of multilateral governance. Yet, in order to address social, economic or environmental challenges of the world, where complexity and uncertainty are intertwined, multilateralism was never as necessary as it is today. At the same time, the globalisation of trade continues (despite the financial crisis) and the geo-economic flows are redefined with the rise of emerging countries and the resulting inevitable reclassification of the hierarchy of trading powers.

The competitiveness of countries, territories and companies is increasingly related to their capacity to anticipate, innovate and lead integrated policies because it has now become crucial to have an intersectoral understanding of issues. In this fast changing world, where one must be able to trade with as many partners as possible and therefore diversify external relations, logistics performance is increasingly strategic. The organisation of chains, the transport of goods and the contractualisation of trade are all essential steps to progress in economic development. The marketing of agricultural products should be improved both in terms of time but also in terms of safety. Increasing trade with higher quality products: the challenge is therefore huge for actors of the agro-food sector.

It is to better apprehend these dynamics that the CIHEAM decided, at the request of its thirteen member states, to dedicate the 14th edition of the *Mediterra* Report to logistics and agro-food trade in the Mediterranean. With a multidisciplinary and transnational scientific expertise, this publication features original papers with both geographical and sectoral analyses. The different contributions are intended to prepare the ground for a broader discussion that should continue in the coming years on the logistical challenges that Mediterranean countries have to meet in order to improve their food security and develop their economies.

The CIHEAM produces knowledge and seeks to adapt this knowledge to the needs of Mediterranean countries thus facilitating its transformation into practical and innovative solutions for development. Logistics is certainly a major theme for the

CIHEAM's actions including training, research and cooperation. Matching supply and demand, logistics is at the heart of trade and human exchanges. It is also the cornerstone of a more inclusive territorial development. This is undoubtedly the main message of this report. I would like to add two others.

A message that highlights the globalisation of agro-food trade in these Mediterranean countries. This reveals the fact that Euro-Mediterranean trade is only a flow among many others in the region. By saying this, we would also like to remind that the Mediterranean is still a great trade corridor through which pass large quantities of goods and where economic growth therefore circulates.

A message that confirms the usefulness of combining comprehensive approaches with local realities. If there are common issues and phenomena in the region, the disparities between Mediterranean countries and territories of the same state require discernment and adaptation. The differentiation of policies to elaborate and the modes of cooperation to promote become a strategic paradigm to support development in the Mediterranean. A development that can neither ignore international and regional growth, nor be built with answers that do not emerge at local level.

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INTRODUCTION

A Mediterranean in transition

The current situation of social and political upheavals in the Mediterranean Basin invites us to reflect upon the state of economies in its bordering countries and the potential leverage for a better development in the region. The employment problem, especially youth unemployment is among the core issues that have triggered popular uprisings across this region of chronic instability with protests whose magnitude varies from one country to another, whether in the northern, southern or eastern shore. The consequences have recently led to political regime changes or even tragic conflicts. The improvement of living conditions is also among the main demands of these populations facing a multidimensional insecurity that plunges them in a highly vulnerable situation on a daily basis. The access to food is a determining variable in this equation. The inflation of agricultural prices on international and local markets weighs on public budgets and household purchasing power.

Thus, the concern of seeing the continued slow deterioration of food security in most Mediterranean countries is not exaggerated even more so if one considers that global agricultural trade is shifting into an era of recurrent nervousness, that the dependence of some countries in the region is increasing and that climatic disasters can affect the major exporting countries. However, regions are not equally affected by food insecurity and impoverishment. Indeed, the wealth gap is often significant between globalised cities mostly located on the coasts, thus open to the dynamics of the globalisation of economic exchange and rural inland areas where poor development predominates. The combination of social and spatial inequalities does not lead to social and political stability, quite the contrary. Therefore, the establishment of an inclusive growth ensuring social and territorial cohesion is an absolute priority for Mediterranean countries.

The Mediterranean interface

As a real barometer of these trends that contribute to putting food and agricultural problems at the heart of contemporary strategic issues, the Mediterranean cannot do without trade. The millenary past of this region has written the main pages of its history through economic activities, trade of goods and human relations. Imperial

powers such as Greece and Rome had already organised a commercial network in the region and even beyond, in particular, to ensure the food supply of this political hub. Trade flows and the logistics required for their implementation were therefore designed very early. While the countries bordering the Mediterranean collectively represent a total population of nearly 500 million inhabitants, the necessity for the movement of food products and the organisation of trade is continuously strengthened.

More than ever, trade therefore plays a crucial role. It highlights the interdependence between Mediterranean countries and establishes new connections with the rest of the planet. Economy is not only limited to trade. Nevertheless, the dynamics of trade between these countries but also those that each of them maintain with third countries can partly condition the attenuation of the above-described problems, at least if trade remains fair. Agricultural and agro-food commodities are at the heart of the globalisation of these economic exchanges in the Mediterranean. In this respect, transport and infrastructure are essential to orchestrate these trade flows at domestic, regional and international levels.

This Mediterra report 2014 therefore aims at exploring the state of trade in the agro-food field. The objective is to highlight trade flows and to understand their logic in the Mediterranean and beyond, i.e. between countries in the region and third countries. By observing trade exchanges, the profound changes taking place at economic level in the era of globalisation can be measured. In the Mediterranean, the flow of goods reveals that besides economic interests, some actors also have political ambitions. A geopolitical map can therefore be outlined.

In this context of a Mediterranean in transition, where the challenge of food security is amplified, this report seeks to highlight the role of logistics. It is important to recall that the sector includes all activities related to the transport and storage of goods, from their production till their arrival at their point of sale. This edition of Mediterra will give an overview of roads, railways, ports and waterways as well as logistics platforms.

The development of logistics enables to improve the competitiveness of companies in markets, to increase trade by reducing transport costs, particularly imports. This may ultimately have a positive impact on economic growth. Logistics has therefore become a key element for the development of Mediterranean countries. Nonetheless, both the media and scientific publications rarely address the issue of logistics and its activity. In addition, this Mediterra report participates to the discussions and reflections that are still too timid on a sector that is yet so crucial.

In the agricultural and agro-food sector, taking an interest in logistics is all the more crucial as its optimisation leads to a better marketing of products. Improved logistics therefore contribute to opening up remote rural areas. In terms of environment, the optimisation of the conveying of agricultural and agro-food products can significantly help reduce losses and waste. In the Mediterranean Basin where the pressure on resources is one of the most worrying, all that can limit waste should be promoted. It is clear that waste is very often a result of inadequate infrastructure and

connections. Beyond the important constraints related to limited land and water resources in the Mediterranean, the improvement of logistics should be in line with the energy revolution that global climate change requires to operate. All the countries must consider their energy mix according to both the economic and environmental prism, this latter being increasingly related to the first. Given the urgency, this *Mediterra* report 2014 will suggest some points aiming at promoting a less wasteful and cleaner logistics system.

Logistics cannot only be analysed through economic and environmental perspectives. The investments in some infrastructures also reveal certain geopolitical patterns. If China is interested in the Greek Port of Piraeus, it is probably not only for economic reasons! Considering that only the most holistic approach possible allows us to get a better insight of reality, this analysis grid will be therefore used from time to time. Given the economic importance of adequate logistics, this report will assess the state of routing systems, the bottlenecks they reveal and the areas for improvement that they offer. In this perspective, the emphasis is often put on the development of infrastructure as a real political and economic issue.

The advancements in the logistics industry of the recent years have led to the development of trade over increasingly longer distances, including the trade of fresh products such as fruit and vegetables. The improvement of the cold chain, the container-ship revolution, the development of port capacity and motorway and rail networks as well as various major infrastructure projects have all contributed to the profound changes in trade across the region. Even if this progress is significant, there is still so much to be done in terms of logistics in order to obtain better performance. Obviously, given the situation, one cannot ignore the framework of cooperation between the Mediterranean shores. The achievements of this cooperation are strongly influenced by the countries themselves. Just as Montesquieu believed, history, particularly in the Mediterranean, has recursively evidenced how profitable trade could be for the region's development. In the Mediterranean area, which is far from being closed on itself, it seems that political stability also depends on the improvement of trade conditions. Trade should be more balanced (trade negotiations) and more flowing (infrastructure).

Agro-food issues from a geo-economic and logistical perspective

In this report, the authors have firstly chosen to introduce agro-trade dynamics in the Euro-Mediterranean region, from their history to their future prospects. However, since Mediterranean trade cannot be limited to the region, some chapters focus on trade dynamics with other regions. Sub-Saharan Africa, Asia, the countries of the Black Sea, the Americas are thus closely connected to a Mediterranean that is both a receptacle of the world and an important hub.

Thereafter, the reader is invited into the analysis of the trade of certain agricultural products that are particularly emblematic of the region such as olive oil, wine and grain. Beyond fields of grain, olive trees and vineyards, the Mediterranean is also

lined with fields and greenhouses where fruit and vegetables are cultivated and whose trade is also interesting to analyse. The same is true for underwater resources whose fishery products abound Mediterranean diets. Besides, meat trade, which constitutes another important source of protein intake, will also be addressed.

The report then features the geography of agro-food logistics that is ultimately very little tackled in literature. This third part therefore proposes to assess the infrastructure of trade including ports, transportation corridors and the cold chain. Emerging issues as well technical and technological innovations will then be addressed.

Aiming to capture a broad and abundant reality, this report is the result of an interdisciplinary approach. All *Mediterra* reports address a subject from a multidirectional perspective and the present report has been written in line with this approach. Not only is this work interdisciplinary, but it is also multinational. Like the preceding reports, this *Mediterra 2014* is indeed based on the work of researchers and decision-makers coming from almost all Mediterranean countries. This is by no means a search for exoticism. This choice rather translates the CIHEAM's long-standing interest in contributing to the existence of a Mediterranean research space. This diversity of contributors also allows a multiscale analysis: even if priority is given to macro-spatial approaches at Mediterranean level, some articles analyse specific national situations.

This *Mediterra* report is a new contribution of the CIHEAM to the progressive reflection and the observatory mission that it has aimed at establishing over the years. In 2008, the Mediterra report was dedicated to the future of agriculture and food in the Mediterranean. Based on a broad grid, the diagnosis enabled to draw future scenarios for the Mediterranean. Four scenarios seemed to emerge: a basic trend scenario of "a Mediterranean without conviction"; a worse trend scenario of "a Mediterranean under tension; an improved underlying scenario of "a fragmented but reactive Mediterranean" with a weak inter-Mediterranean cooperation; and lastly "a confident Euro-Mediterranean" was the scenario to aim at. Six years later, we must admit that the last scenario was not the one that had the biggest breakthrough over the years. After the historic liabilities and political disputes that have hindered cooperation in the Mediterranean, the current political and economic crises seem to worsen the situation. However, at a time when multilateral cooperation and regional integration seem idle, it is important to look at the history that teaches us how coordinated efforts have allowed to overcome several crises. The CIHEAM has already stated that it is convinced that "forces should unite rather than lose momentum separately". Development paves the way for peace but it does not imply a zero-sum game. The logistics trade sector proves this quite clearly.

CHAPTER 1

A GEOHISTORY OF AGRICULTURAL TRADE: THE LONG TIME SPAN THAT ENLIGHTENS THE PRESENT

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Trade in the Mediterranean is a powerful analytical prism of the great facts of history. It indeed reveals the demographical and political dynamics of a region whose history, at global level, is the one that plunges the furthest back in time.

Since they are directly related to basic needs, agricultural products are the special markers of the passing of time and the logic behind it. Unlike products whose use may devalue over time or even disappear, agricultural products are timeless due to their fundamental and irreplaceable nature. Analysing agricultural trade through different eras is therefore interesting in order to achieve a better understanding of the Mediterranean whose history is deeper than its geography is vast.

Of course, as soon as we get a deeper insight into distant history, trade statistics disappear very quickly. In order to identify old trends, we cannot rely on customs statistics as they are only consistently maintained since the 20th century. We must therefore resort to chronicles of observers even if archaeological evidence – including plenty of amphorae in some places – provides more quantitative tools. The history of agricultural trade is therefore necessarily incomplete and inevitably approximate.

By constantly combining data with well-established episodes of agricultural trade, this narrative shows the crucial significance of agricultural products in trade and strategies of power of geopolitical players who were or still are important in the Mediterranean. It also highlights the fact that trade has not always been as pleasant as Montesquieu wanted to believe as it has taken place in contexts of domination and violence. Lastly, if this historical perspective points out invariants, it primarily allows us to perceive an unprecedented contemporary Mediterranean through the prism of long periods.

From local to regional

The Neolithic revolution led to the emergence of agriculture. Linked to a change in climate, it first occurred in the Mediterranean. It was indeed due to a global climate warming and moistening taking place between 14000 and 11000 B.C. that flora started growing in the eastern Mediterranean. Archaeology shows that wild cereals were then consumed in the Middle East: cereal grains were crushed in a mortar to be eaten as gruel or already processed into flour (Albertini, 2009).

The gradual transition from hunting and gathering to agriculture took place at around 9000 B.C. when men started selecting species that made the fortune of the Mediterranean. It was precisely in the Fertile Crescent, the rich strip of arable land, that straw cereals (barley and wheat) and some legumes were gradually selected. Also helped by climate change, the population growth encouraged the domestication of wild species. A little later, between 8500 and 8000 B.C., sedentary men tamed wild animals to transform them into increasingly selective species such as the goat, the sheep and the donkey. It is also important to note that conservation techniques were developed in parallel, especially the underground storage silo.

Like a groundswell, agriculture and livestock farming spread across the Mediterranean with the waves of migration coming from the east of the basin. Enabled by the development of agriculture, it seems that population growth has led to this phenomenon. Even if agriculture provided more sources of livelihood, hazards did not fail to affect it. In addition, the competition for food resources sometimes required the departure of some peoples settled in the eastern Mediterranean to move and colonise new lands. Launched in the Middle East, this process of colonisation/Neolithisation actually took place according to several waterways. The Danubian waterway enabled the arrival of agriculture in northern Europe via the Danube. The Mediterranean waterway allowed the implementation of agriculture in the northern coastal lands of the basin. This took place mainly through the exchanges occurring in the Mediterranean Sea. This process emerged in Crete, in mainland Greece, in the Balkans and in southern Italy between 6800 and 6100 B.C. and then in Sicily, in Malta, in Cyprus, in Spain and in France between 6100 and 5700 B.C. As for North Africa and Egypt, agriculture was established through the so-called African distribution channel that was mainly terrestrial.

These processes of distribution announce the development of trade at a very local level, that is, between emerging cities and the surrounding countryside and then between distant households. The emergence of a city – or rather a big village – such as Jericho at around 8000 B.C. gives evidence of the early occurrence of local trade exchanges allowed by the development of agriculture. The development of agricultural trade then enabled urbanisation in southern Mesopotamia with the Sumerian civilisation and also in Syria at around 3000 B.C. Agriculture generated food surpluses indeed. Thus, it allowed some of the people to focus on other activities in order to meet their food needs indirectly. The use of the "recently" domesticated donkey and also the use of rivers like the Nile, made this trade possible.

During these ancient times, agricultural trade especially took place over short distances, as populations did not need to seek food resources far away. This was the

case of the city-state of Ebla, situated about 60 kilometres away from the current Aleppo, which reached its peak at around 2500 B.C. However, the beginnings of a large-scale agricultural trade seemed to emerge with the first empire founded by Sargon of Akkad (2334-2279), covering most of the area of modern Syria and Iraq. Almost situated in the same area between the two major wealth-providing Mesopotamian rivers, the Babylonian empire emerged between the 18th and 15th centuries B.C. At around 1500 B.C., trade distances stretch especially with the development of convoying. A new Mediterranean civilisation was then found in Crete where Minoans, coming from Anatolia, constructed unprecedented architectural ensembles. Described as such by Herodotus and Thucydides because it reigned over the Aegean Sea, this Minoan thalassocracy had to turn towards Egypt to stock up on grain. Figurines found in Crete indeed represented Minoan emissaries that went from the island to the Pharaoh's court to beg him for grain coming from the Nile Valley (Abulafia, 2011). Very early, this Egyptian civilisation had developed the cultivation of grain and bread making processes. After the unification of the country in the 4th millennium under the reign of King Narmer, irrigated agriculture was indeed highly developed. It benefited from flood management whose strength determined the width of agricultural land each year and hence its productive capacity. The use of the waters of the Nile has thus conditioned the early stability of Egypt and was a decisive factor contributing to its power. Besides, it was this nurturing dimension (Abulafia, 2011) that probably attracted some Jews from the land of Canaan to the north. The Bible recounts this episode. However, for a long time, Egypt still seemed little turned towards the Mediterranean. The first port of Alexandria was not founded before the 4th millennium (see below).

Box 1: How was food stocked in ancient times?

Long-term storage was developed since Antiquity, either for agricultural (seeds), domestic (family storehouses), social (stocks in anticipation of famine or conflict) or commercial (trade) purposes. It was necessary to protect crops from fire, mould and attacks from various predators (rodents, birds and insects). The most common storage process was the underground silo, which is a sort of pit with a narrow opening dug into the ground. In the absence of oxygen, grains enter a dormant phase that favours conservation while keeping their germination capacity. In Ancient Greece, jars were increasingly used to store oils and wines. In order to store grain, they used dug silos, granaries (the *horreos* in Galicia come from this period) with slits allowing ventilation and also stone vaulted cellars. The Romans also used these storage methods and developed coating techniques to protect cereals from snout beetle attacks. The *amurque* (solid material or resin[1]) resulting from the pressurisation of the olive was then spread in the receptacles.

Long-distance trade was mainly developed as from 1000 B.C. with the Phoenician civilisation. Located on the coastal plains stretching from today's Israeli Galilee to Ugarit in Syria, the heart of this civilisation was mainly settled in the areas between Byblos and Tyre in Lebanon including Sidon. Backed by a very narrow hinterland

1 - Translator's note.

while the inland plains were usually controlled by different powers, this civilisation spread throughout the Mediterranean. The Mediterranean was perceived as an ensemble for the first time in history under the influence of the Phoenicians.

The issue of the supply of Phoenician cities arose very early. Thus, around 960 B.C., while King Hiram reigned in Tyre, the biggest among other cities, an agreement allowing the Phoenicians to receive wheat and oil produced by Hebrew farmers in exchange for wood mainly destined for the construction of the Temple was signed with King Solomon (Finkelstein and Siberman, 2002). However, "food, oil, wine and raw materials had to be brought by sailors" (Braudel, 1985b, p.108). The large quantities of wood in the forests of Mount Lebanon allowed them to form an effective fleet, sail across the Mediterranean and even reach the western shore where they established various trading posts. Carthage, Lixus and Utica in North Africa were among the first to be established between 1100 and 800 B.C. The foundation of Cadiz on the Atlantic Coast showed the ability of the Phoenicians to design very stable boats capable of crossing the Strait of Gibraltar, that is, the famous Pillars of Hercules. Phoenician technology enabled them to practice offshore sailing helping them to save time as well as to control the Mediterranean Sea currents. However, it is important to note that this trade was far from being only agricultural. Besides, the Phoenicians did not only trade wine, oil and grain for their own use; they also provided commercial services for the peoples settled along the Mediterranean basin and elsewhere.

Founded in 814 B.C., Carthage was by far the most famous Phoenician trading post. For those coming from the east of the Levant, the city was situated on the most advanced part of the African continent in the western Mediterranean. In turn, Carthage became a real city-state, gradually detached from the eastern cities under the pressure of their neighbours[2], but also a maritime power in the western Mediterranean basin. The presence of a rich agricultural hinterland, particularly the Cap Bon peninsula and the Meterdja valley allowed them to develop an agriculture whose practices were spread by the Carthaginian agronomist Magon between the 6th and 3rd centuries B.C. Thus, for several centuries, Carthage was able to source locally and to trade its agricultural products (wheat, fruit and wine) while consolidating its position as a leader of the other trading posts in the western Mediterranean. Carthage was "the new Phoenicia" (Braudel, 1985b, p.109).

Carthage dominated over the south of the western basin between the 6th and 3rd centuries. However, it was absent in the North of the Mediterranean where the Etruscans dominated northern Italy since the 8th Century. The Ionian and the Aegean regions were under the influence of the Greeks. Although the Myceneans seemed to be at a distance, there was an increase in population in Attica and in the Aegean Islands at the turn of the 8th century. The advances in agriculture and the development of terracotta granaries that facilitated food preservation undoubtedly enabled this

2 - Situated in the Eastern Mediterranean, these Phoenician city-states were jealous of the independence. They were subjected to the greed of people from the lands: first, in the eight century, the Assyrians even destroy Sidon and then Babylon that exercised its sovereignty in - 586 and the Persians who arrive on the eastern shore of the Mediterranean in the sixth century.

growth. Nevertheless, the increase in population seemed to be too important for the local supply to meet demands. Besides, the issue of the survival of the plethora of farmers settled in Greek territories and lacking lands arose. This lack of food and land led to the colonisation of the Aegean and Ionian region between the 8th and the 6th centuries. Other distant areas organised in cities were also colonised by the Greeks: this was the case in southern Cyrenaica, the shores of the Black Sea and the Gaul where the Phoceans – Greeks coming from Asia Minor – founded the port of Massalia (Marseilles) where they organised the trade of wine.

In the 5th century, Athens was the figurehead of these cities. It was under the leadership of Athens that the Greek city-states formed the Delian League to fight together during the Persian Wars (between – 490 and – 470 B.C.). The Persians arrived on the eastern coast of the Aegean under King Darius I. The food needs in Athens were not entirely met so the city had to get supplies of grapes, cucumbers, figs and honey from its immediate surroundings but grain arrived farther away at the great port of Piraeus. The Black Sea provided the product of its coastal plains but it was Sicily that supplied the largest amounts of agricultural products to Athens as well as other major Greek cities. Sicily's agricultural capacity and its geographic situation placing it at the crossroad of trade flows made it an important granary and garden for a very long time. Navigating the strait was certainly not easy as the myths of Scylla and Charybdis were even created in ancient times. However, being the largest island of the Mediterranean with a surface area of 25,708 kilometres squared, Sicily therefore provided extensive agricultural lands. It is also interesting to note that the island's eponym comes from the contraction of the Greek words *syke* (figs) and *elaia* (olive trees). The lands are abundant but the topography is not the most favourable. In fact, 61% of this land is hilly and 25% is mountainous. In the end, the island has few plains, the most important plain being that of Catania with its 430 kilometres squared, but the rolling hills facilitate the plantation of grain and olive trees.

Sicily is so essential for the supply of Greek cities that it even found itself in the middle of the Peloponnesian wars (between – 431 and – 404 B.C.) between Sparta and Athens that fought over the control of the granary-island. Supported by the Persians, Sparta finally won. Threatened by famine, Athens surrendered in – 404 B.C. Even though he was King of Macedonia, it was Alexander III the Great who avenged Athens and pushed the Persians out of the Mediterranean coasts before submitting them to a great empire. The empire did not last long but some of Alexander's imprints survived his death. Besides the Hellenisation of the eastern part of the basin, he founded Alexandria in – 331 B.C. thus opening Egypt to the Mediterranean and increasing its trade opportunities. Until then, Nilotic societies were all very little turned towards the Mediterranean basin even if some trade exchanges had been developed in a sporadic way.

It was under his successors the Ptolemies, that trade developed between Egypt and the Mediterranean via Alexandria. Many products, especially hazelnuts from the Black Sea, Chios cheese, olive oil, figs and honey, transited through the port of Alexandria. Grain was the most traded product as Egypt had continued to develop its production. During this Ptolemaic period (330 to 30 B.C.), flood recession cropping that had prevailed for centuries and innovations such as the *Saqqia* and the Archimedes (El Faiz, 2004) screw allowed the development of irrigation especially

during the Fayum depression. Located due North, the Island of Rhodes was therefore a very good customer of Egypt to which it provided wine; Athens and other cities also benefited from Nilotic cereals since the grain coming from the Black Sea were less accessible due to the invasions of the Celtic and Scythian tribes on its coasts. It is also important to note that Indian spices were already arriving through a channel running from the Nile Delta to the Red Sea built around 270 B.C. This canal actually connected lakes that have disappeared due to the presence of the Suez Canal. The Indian Ocean and the Mediterranean have been connected through this channel for a long time. Much later, the bypassing through the Cape of Good Hope did not eliminate this possibility.

On the threshold of a new era, the Roman civilisation emerged in another part of the Mediterranean basin. Under the Romans, the Mediterranean became both a unified and dominated empire.

Mare Nostrum or the first integration-domination

Before it was urbanised by the Etruscans as from – 750 B.C., Rome was an Italian city like many others. It started living its own destiny after having expulsed its founders in – 504 B.C. In the shadow of brilliant Greece, Italian cities fought against each other for a long time before Rome unified the peninsula between the 6th and the 3rd centuries. Etruria to the north and the southern part where the Greeks had established colonies, were the last to engulfed under roman rule at around – 265 B.C.

The Roman republic innovated in the field of traffic as it gradually developed its influence throughout the territory. Coupled with a thirst for expansion and hegemony over Italy, the will to protect itself from attacks, led the still fragile republic threatened from outside to set up a network of gravel roads and staging posts. Designed by the Censor Appius Claudius Caecus and connecting Rome to Brindisi, then a major port for trade with Greece and the East, the *Via Appia* was the first to be established in – 312 B.C. With a very regular width of 4.1 metres, it was paved with large slabs of curved basalt allowing traffic. It was bordered with dirt roads for pedestrians. Subsequently, other roads enabling faster and easier circulation of market goods and rapid movement of troops were built. The lust for power did not stop at the boundaries of the peninsula. Rome clashed with Carthage, the dominant power in western Mediterranean. *Delenda est Carthago*, was the reason behind the Punic Wars that took place in several episodes from – 264 to – 146 B.C. In – 264, Carthage was defeated and had to yield the island of Sicily, the "first jewel of the imperial crown" according to Cicero. Sicily was a particularly strategic granary for Rome whose population had increased significantly. Thanks to its fleet, Rome finally managed to win over the Carthaginians after more than a century of conflict.

Now that the Carthaginian lock had snapped, Rome gradually spread throughout the Mediterranean and founded an empire during the reign of Octavian in – 27 B.C. who renamed it Augustus. The conquest of Egypt by the Romans three years earlier

was an essential step in the unification of the Mediterranean. The greed for grain coming from the Nile seemed to have been a determining factor in the acquisition of this territory (Abulafia, 2011). With the gradual expansion of the Empire, the Roman administration continued the construction of roads like those that had been established in the peninsula. At its peak under Trajan, the major Roman road network reached about 150,000 kilometres linking the 3 million kilometres squared of the Empire. This network was completed with important harbours and maritime routes that placed the two large Italian harbours of Ostia and Pozzuolo at less than a distance of 20 days away from the most remote ports of Alexandria and Laodicea (the ancient Latakia).

Due to this expansion of road and maritime networks at a large-scale, entire regions specialised in certain products and traded with each other: wine was to be found in Gaul and Hispania, cereals in Numidia, Lebanon, Sardinia, Sicily and Egypt, oil in Africa and Betica, meat products (smoked, salted™) in Gaul. In the framework of this trade expansion, the arrival of agricultural products weakened the Peninsula's farmers, obliging them to become settlers on the public lands (public *ager*[3]) provided by Rome, thus securing the conquest.

The empire was therefore secured – the so-called *pax romana* – by the control of the land but also that of the sea since piracy became a threat. Thus, in – 66 B.C. Pompey set up a system of protection especially around Sicily, North Africa and Sardinia which were what Cicero called the "state granaries". Land was also offered to pirates. In return they abandoned their actions at sea.

This evocation of the Roman epic therefore illustrates Rome's obvious concern for organising the food supply including the development of an institutional framework that lasted several centuries. Under the Republic, a magistrate could be appointed in times of insecurity. Gaius Gracchus went much further by setting up the agrarian laws in – 123 B.C. in order to help the poor plebeians. The *lex Sempronia frumentaria* planned to distribute a bushel of wheat per month at reduced prices to all the poor citizens. Nevertheless, like the law related to land redistribution encouraged by his brother, this so-considered "clientelist" policy attracted criticism.

Under the Empire, the institutionalisation of food monitoring deepened and led to the appointment of an officer of the *Annona* (name of the goddess of supply). Supervised by this Prefect, the organisation of grain supply continued to develop with the aim of avoiding disruptions. The period of the republic had been able to show that supply disruptions were sources of instability. Thus under the authority of the *Annona* Prefect, the Empire's commodities were transported to Rome by convoys of galleys. After having been transported towards the capital of the empire via the harbours of Ostia on the Tiber or Pozzuoli (near modern Naples), the products were then stored in the city's warehouses (*Horrea*) before being sold, either to bakers in the case of wheat or to other retailers in the case of other products. Prices were free but at the time of Augustus, part of the stored grain was distributed to

3 - Wealthy families had appropriated these lands. This led to land concentration in the second century BCE. The tribune Tiberius Gracchus and then his brother Caius opposed this state of affairs between – 133 and – 121.

the poor. The number of beneficiaries was fixed to 200,000 citizens and this did not change until the end of the empire (Garnsey, 1995). The quantity of wheat distributed for free amounted to 80,000 tonnes per year. In the first century this represented a third of the total annual requirements of the city of Rome[4].

With the building of Constantinople in the early 4th century, the flow of cereals was gradually changed as the city founded by Constantine mainly consumed wheat coming from Egypt and the Black Sea while Rome obtained wheat from North Africa and Sicily. The fact that wheat crop yields were more variable in North Africa than in Egypt was an additional source of fragility for Rome that was already subject to pressures from the so-called Barbarian peoples since the 3rd century B.C. The conquest of North Africa by the Vandals in 435 B.C. stopped Rome's supply of grain. This was a terrible blow against the city before the collapse of the western Roman Empire. The Mediterranean basin was thus divided between the Barbarians settled in the western Mediterranean (Visigoths in France and in Spain, Vandals in North Africa and Ostrogoths in the Balkans) and the eastern Roman Empire that dominated the eastern Mediterranean including Egypt.

Insecurity and prosperity in a divided Mediterranean

The restoration of a great Roman Empire by Justinian in the 5th century B.C. was only temporary. A century before his death in – 565, the "knights of Islam" coming from the Arabian peninsula took over all North Africa and the Middle Eastern lands except the Byzantine territory. During the first centuries of Islam, the Mediterranean was therefore fractured once again.

With the occupation of the southern shore of the Mediterranean as from the 7th Century B.C., the Egyptian supply of Byzantium was suspended and henceforth wheat was transported to Constantinople via the Danubian region. Constantinople also developed a policy to support smallholder farmers while peasant-farmers (the stratiotes) were sent to cultivate and protect new areas (Carpentier and Lebrun, 2001).

By developing an innovating urban civilisation in the Mediterranean, the Arabs themselves got their supplies from North Africa and Egypt. Even the newly Arab Andalusia partly stocked up on cereals from North Africa. The Arabs who had turned towards Central Asia and the Indian Ocean where they met Chinese merchants, imported products that were hitherto unknown in this Mediterranean geographical region. This was particularly the case of citrus fruits, cotton, rice, the eggplant, the asparagus, the chicory and the sugar cane that broadly expanded the Mediterranean production base.

On the southern shore of the Mediterranean, the Arabs made use of the camel for caravan convoys. Nevertheless, they also had a shipping fleet even if they were more turned towards coastal navigation than sea crossings. Of course, ships still navigated

4 - Flavius (Josephe), *Les Guerres juives*, see Philippe Remacle's website (http://remacle.org/bloodwolf/historiens/Flajose/guerre1.htm).

from all around the Mediterranean to Alexandria even well after the Arab conquest: from Seville to the Syrian harbours, the Mediterranean was still sometimes crossed in one go. However, this fleet operated mainly on more limited trajectories: it was active in the eastern Mediterranean that had become a "Muslim lake" in the 9th century B.C., thus benefiting from Sicilian agricultural products taken over from the Byzantines.

This Mediterranean and commercial bipolarity between Byzantines and Arabs – but can we really speak of Arab unity with the rise of the Shiite Fatimids? – was put into question from the second half of the 11th century. Coming from northern Europe, the Normans were particularly good navigators. They arrived in the western Mediterranean and took over Sicily from the Arabs, thus breaking the chain of grain supply that was so important for them.

At the end of the 11th century, another event of major significance took place. Associating Normans and Europeans, the first crusade began before many others that followed until the 13th century. Thus at the east of the basin, the Levant welcomed a Latin presence that facilitated trade with the increasingly successful Italian cities. Genoa, Pisa and Venice prospered by transporting crusaders, pilgrims and goods to the Levant that was transformed into states. Moreover, these cities traded with the Arabs, especially with Saladin whose empire included the hinterland of the Latin States, namely Egypt and Syria. The *Funduq*, a sort of commercial complex dedicated to Italian merchants, developed under his reign (Éddé, 2008).

If they monopolised trade in the East, in the western Mediterranean, these Italian cities shared their domination with Amalfi. After its provisional conquest by the Normans in the 12th century, like Venice, Amalfi had to abandon the advantage of ensuring its trade that was granted by the Byzantines. Since when the Normans invaded Amalfi, the city had to be satisfied with remaining in the Tyrrhenian Sea where it was active in the trade of wine, wool and oil before being taken over by the State of Aragon in the 15th century. Thanks to its Catalan fleet and from the harbour of Barcelona, the State of Aragon aimed to spread its influence in the western Mediterranean.

Having taken over other Italian trading powers such as Pisa and Genoa, Venice was especially dominant throughout the Mediterranean during the 15th century. Well before having reached prosperity, first of all, Venice built its fortune thanks to its lagoon that allowed the collection of salt. The commercial benefits that were then provided by Byzantium and the active participation of the city in the Fourth Crusade enabling the expansion of its influence in the eastern basin, were important steps that contributed to its progression. Nevertheless, Venice was strongly affected by the plague that came from Crimea via the ships transporting grain in 1347. In Europe and in the Mediterranean, more than half of the population had indeed disappeared due to this epidemic. Consequently, the productive potential and trade have also dried up. According to Ibn Khaldoun who had lost his parents and many members of his family, "civilisation both in the East and the West was visited by a destructive plague which devastated nations and caused populations to vanish. It swallowed up many of the good things of civilisation and wiped them out. It overtook the dynasties

at the time of their senility, when they reached the limit of their duration. It lessened their power and curtailed their influence. It weakened their authority. Their situation approached the point of annihilation and dissolution. Civilisation decreased with the decrease of mankind. Cities and buildings were laid waste, roads and way-signs were obliterated, settlements and mansions became empty, dynasties and tribes grew weak. The entire inhabited world changed" (Ibn Khaldoun, 1863, p.130). Despite the fact that is had been greatly affected by this disaster, in the 15th century, Venice was a real *stato da mar* with a myriad of trading posts and island territories including Cyprus and Crete that provided a staging post for its fleet. Until the 16th century, Venetian vessels often entered the ports of Constantinople, the Black Sea, the Levant and Egypt. This fleet allowed a clear development of trade, including food and agriculture, both in the Mediterranean and beyond: thanks to Venetian ships, the Islamic world provided spices from India, exotic fruits, dates and grain from Barbary (North Africa) while it imported olive oil; Byzantium also provided wheat and bought wine; the Ionian Islands and the Peloponnese exported raisins, fruit and oil; engaged in a textile proto-capitalism, the West imported wool and linen. Even if Venice was mainly specialised in ship owning, it still needed to stock up on food products. This is what allowed the development of its trade. Agricultural production was stimulated on some of its conquered territories including Cyprus where wine and oil were transported to Venice.

However, at that time, Venice the Serenissma had to face a new rival. To the East, the Ottomans who were the heirs of the tribe of Osman that had taken over all the Turkish tribes coming from Central Asia, began to expand the power of what was to become a great empire. The capture of Constantinople by Mehmet II in 1453 marked an important turning point in the construction of this Ottoman Empire that grew significantly during the Sultanate of Suleiman the Magnificent. Under the reign of his successor Selim II, to the detriment of Venice, the invasion of Cyprus in 1570 expanded Ottoman influence while securing trade, including that of the grain, in eastern Mediterranean. Indeed, this island struggled against the largest Ottoman harbour of Mersin and during periods of low crop, Cypriot corsairs threatened Turkish boats bringing grain from Egypt.

Therefore, the influence of Venice in the Mediterranean decreased with the Ottoman's conquest of Cyprus[5]. Moreover, the rise of competing powers seriously harmed its influence. Thus, in recognition of their support against the Holy Roman Empire in a sealed covenant in 1535, the French obtained a regime of capitulations giving them commercial advantages in the Ottoman Empire. Above all, the Mediterranean trade that had so enriched the city of Venice began to decline in the 16th century. The discovery of the new world was still too recent to be considered as an important factor that brought about global changes. Fernand Braudel states that this is partly explained by the progress in land transport, especially thanks to the breeding of milking animals (Braudel, 1985a). However, according to Abulafia, more than being a cause, this was rather a consequence of sea/land overthrow (Abulafia,

5 - However, despite the acquisition of Cyprus, the Ottoman's expansion towards the West is interrupted by the defeat of Lepanto in 1571. Venice contributes to this battle against Istanbul by participating to the Holy League associating Spain and the Holy Empire.

2011). For this historian, the manifest insecurity in the Mediterranean Sea contributed to the development of land transport and the advances in animal genetics. At the end of the 16th century, the Mediterranean was divided between two naval powers, the Ottomans in the East and in the South of the basin and the Spaniards in the western Mediterranean. Under Ottoman sovereignty, Barbary[6] corsairs threatened trade. Nonetheless, in his work, Fernand Braudel also explains that if maritime trade declined, grain trade by sea lasted somehow. The animal revolution did not allow the conveying of large tonnages that were required by such trade. On the other hand, neighbouring granaries like Sicily were no longer sufficient. In fact, after taking a long time to regain its former levels after the Black Death, Mediterranean population increased. Braudel also points out that the culture of grain in the West was then challenged by more profitable products such as vines and olive trees.

Thus, during this period of the 16th and 17th centuries, life in the West "is balanced by goods coming from the Levant that was less populated but rich in exportable grains that generally cost less" (Braudel, 1985a, p. 335). However, at the end of the 17th century, having to cope with an increase of its needs, the Ottoman administration banned exports of grain (wheat and rice) from the empire that mainly counted on Egyptian wheat. But the strong demand for grain in Europe resulted in the development of trafficking and smuggling of goods through the port of Alexandria[7].

Reconfigured shores: Mediterranean trade under control

This bipolarity lasted for two centuries with on the one hand, the Ottoman Empire whose territory was very vast and on the other hand, an emerging but a very contentious Europe. In this context, the Mediterranean remained an insecure corridor especially its western basin where the Ottoman regencies in the Maghreb depended on raids. In the early 19th century, risks kept increasing in the Mediterranean. The French Revolution led to the Napoleonic wars during which France had to face counterrevolutionary coalitions including the great British power. With the aim of weakening the food supply of the Crown, Napoleon decreed a blockade against the British in 1807. So his corsairs temporarily took action in the Mediterranean where they boarded and searched British ships particularly those carrying grain from Egypt. Moreover, Egypt and the eastern Mediterranean region were coveted by these two rival European powers. The Mediterranean was the route to India and soon to become the route that led to oil.

The conquest of Cyprus by the British in 1878 in exchange for their support to the Sultan against the greed of the Russians showed that this western penetration was facilitated by the Ottoman Empire's increasing difficulties in the 19th century. It is important to remember that this Russian offensive against Istanbul was conducted

6 - During this century, this was the name used to refer to North Africa.

7 - The Ottoman Empire had implemented a series of measures to prevent seizure of ships, including a ban on any vessel loaded with grain leaving an Egyptian harbour without an authorisation from the pacha, the obligation of guarantee for the captian who was insured by the police officer (*sûbâshi*) or the market controller (*muhtasib*), and the obligation for the captain to hand a delivery report to the authorities in Alexandria.

during this century with the aim of protecting, in particular, the transit corridor of its wheat towards the Mediterranean and importing some products (especially oil and wine) that they had become fond of from its riparian countries.

Adding to this Russian pressure, the Sultan had to cope with an economic crisis that had a strong agrarian component: the Ottoman empire's source of income still depended essentially on agricultural taxation since the industrial diversification had not taken place yet (the rejection of the printing press on the pretext that it was potentially sacrilegious had cut the Ottomans from the dissemination of knowledge). Yet, heavy taxation and widespread corruption have led to the abandonment of agricultural land (Landes, 1998). In the 19th century, this economic weakness was accompanied by the territorial losses of the Ottoman Empire resulting from the rise of nationalism in the Balkans. Greece was progressively detached from Egypt under the reign of Viceroy Mohamed Ali 1805-1845) after the British and the French had fought to take control of the country in the early 19th century.

Aware of the potential of its territory and the strategic nature of grain and cotton, the viceroy of Egypt stimulated agriculture in the delta. The British were particularly fond of Egyptian wheat; in fact, they withdrew from Alexandria in 1807 after Mohamed Ali agreed to provide the wheat that they needed in the Mediterranean for their fleet in Malta. This wealth enabled him to finance his struggle against the Mamelukes and buy the necessary support from Istanbul in order to maintain his position in Egypt. Not only he kept his position but he also managed to completely detach his country from the Ottoman Empire. Consequently, the Ottoman Empire lost control over a very important granary.

Under its rule, the first major irrigation works were engaged. They also facilitated the development of long-staple cotton and sugarcane. By forming alliances with Saint-Simonian[8] engineers arrived in Egypt in 1833, Mohamed Ali managed to carry out major irrigation projects that gradually replaced the traditional flood systems. The pipelines perpendicular to the Nile ensured flooding and flood-recession cropping. Long pipelines parallel to the river that enabled water circulation in an increasingly integrated hydraulic system gradually replaced the perpendicular pipelines. Nevertheless, the first dam built to increase the water levels of the Nile during low flow periods was only envisaged in 1840. It was constructed between 1860 and 1880 in the Delta under the reign of Ismail. Built where the Nile splits in two branches, Rosetta and Damietta, the dam had to increase water levels during dry periods in order to facilitate irrigation. These works were undertaken in a context of an important increase of cotton prices amid Civil War (1860-1866), which reduced American presence in the global market.

After having benefited from these favourable conditions, Egypt enjoyed another opportunity to immerse itself in the heart of trade with Europe. Egypt was a very important producer of commodities. Moreover, the completion of the Suez Canal

8 - Saint-Simonianism develops in the Wake of Bonaparte's expedition to Egypt (1798-1801). Apart from soldiers, Bonaparte had brought 167 scientists, engineers and artists. This intellectual flow nurtured the representations of a common Mediterranean, perceived as a kind of nuptial bed between the East and the West. A group of Saint-Simonians arrived in Egypt in 1833 with the economist Barthélemy Enfantin.

in 1869 upon the initiative of the French placed Egypt as an even more essential player in international trade as it became a strategic passageway. However, the collapse of the Egyptian government in 1876, partly due to the decline of the cotton trade, enables London to take control over the canal before controlling political life in Cairo. As in other times of its history, this British rule placed Egypt under the control of a central authority to which it was supposed to provide agricultural raw material. This was also the reason why the British established the first dawn of Aswan inaugurated in 1902 in order to control flooding and to develop irrigation. The independence in 1923 was a false was as London maintained its control over a country that detached itself from European tutelage in 1952.

In the Middle East, some territories gradually supply an increasingly radiant Europe. In Palestine where the British have supported the establishment of a Jewish homeland in 1917, Jewish settlers of the Yishouv produced citrus fruit that were exported to Europe. Moreover, Palestinian Arabs produced olive oil-based soap for the European market that particularly transited via the port of Marseilles. Similarly, in the 19th century, influenced by silk manufacturers from Lyon, the then autonomous Ottoman province of Mount Lebanon progressively specialised in the culture of mulberry. This was essential for the production of silkworms.

In the Maghreb, the Ottomans ruled everywhere except in Morocco. The French, the Italians and the Spanish who established protectorates or colonies progressively replaced Ottoman rule. In Algeria, where the presence of the French dated back to 1830, there has been a massive colonisation in the late 19th century. Landless French farmers coming especially from the Alsace-Lorraine region that was annexed by the Germans in 1871 were sent to settle in Algeria. Thus, the number of settlers has increased from 245,000 in 1872 to more than 750,000 in 1914. Land appropriation was facilitated by the Warnier Law (1885), which had obliterated the inalienable character of *arch* land (collective land). This important immigration facilitated the expansion of viticulture, which increased from 20,000 hectares in the early 1880's to more than 200,000 on the eve of World War II (Vallaud, 2009). At the time, colonial lands represented 40% or arable land, often the most suitable for agriculture.

Later, Libya suffered the same fate as it was invaded by Italy after their victory over the Turks in 1912. Likewise, landless farmers from Calabria, Venice and Sicily were sent to the new lands to exploit the region of Cyrene in particular.

Until the Second World War, Mediterranean agricultural trade was therefore South-North oriented. The South produced for a European region that required agricultural raw materials. The number of mouths to feed increased exponentially – a demographic transition was occurring even if the two wars limited its effects – and industrialisation called for the massive use of raw materials such as cotton.

A New Mediterranean

After the Second World War, a new order emerged in the Mediterranean. Egypt gave the signal of the upheavals that were to take place in the Arab World. The revolution in Cairo in 1952 marked a change in the political regime and a detachment

from British rule. The states of the Levant and of the Maghreb were going through a process of decolonisation after several centuries of Ottoman domination followed by French, Italian or British occupation. After the Second World War, there had never been so many sovereign states in the Mediterranean.

These independent states often gave priority to agriculture for food security purposes as a guarantee for their political stability and sovereignty (Blanc, 2012). Major efforts have also been invested in hydraulic development, land reform and support was given to agricultural organisations. Syria, where the Baath Party proposed several pro-agrarian reforms and Egypt, under Nassar, were the models of these land, hydraulic and organisational choices. Nevertheless, this political transition was also accompanied by a demographic transition. Everywhere, the mortality rate dropped sharply while the decline fertility rates was slower. Between the two, the population growth rate increased with rates varying from one country to another (Courbage and Todd, 2007).

Thus, despite the productive efforts, trade balance deteriorated in the southern and eastern Mediterranean countries (except Turkey) even though it was stable in the early 1960s. Europe particularly benefited from this situation as the common agricultural policy supported the agricultural revolution in the northern Mediterranean. The implementation of guaranteed prices brought security to the producers thus encouraging investment, which is a powerful factor of productivity. For the first time in history, the polarity of trade was therefore reversed during the last decades of the 20th century. Agricultural trade became highly asymmetric with the clear predominance of the north. A few decades ago, who would have imagined that North African and Middle Eastern countries would engulf a fifth of the French soft wheat production? (Abis, 2012). Thus, while the South and the East had been important grain suppliers, they had now become increasingly dependant on the North and more broadly on the world.

This entry of non-Mediterranean powers into agricultural trade is another element that should be highlighted. History has certainly showed that the products consumed in the Mediterranean had been imported from Asia, especially by the Arabs or through the shores of the Dead Sea by the Byzantines or the Turks. However, the uniqueness of this trend lies rather in the significant share taken by third countries in Mediterranean trade. Since the early 1950s, American grain rivalled the one coming from Europe. It now rivals the grain coming from Russia and Ukraine while meat rather comes from South America. If the Mediterranean is no longer the world-economy that it has been once, like never before, it serves as a receptacle of influences and trade logic coming from afar.

Today, agricultural trade in the Mediterranean is booming without being hindered by insecurity as history has showed so consistently. Moreover, unlike the past, agricultural trade takes place between sovereign states. In the past, dependency relationships prevailed between leading consumer cities and productive territories that were sometimes far away but under domination. Agricultural trade therefore seems to be "liberated" from these relations of dominance or of subjugation. At the same time, we are witnessing a tariff dismantling. Better yet, this trade takes place today in a

Mediterranean region that is somehow trying to invent a space for cooperation. Although the region is not free of geopolitical tensions, with regards to trade at sea or between the shores, this present time seems to be far away from many long periods marked by domination/capture or by an insurmountable insecurity.

Among various innovations, it is important to point out the technological developments. If the Phoenicians, the Romans and the Venetians, to name just a few, have gained such influence in the Mediterranean, it is clearly because they have introduced major innovations in navigation techniques but also in logistics. Not to mention the past only, the present times are also very rich in technological and organisational advances. Containerisation, multimodal platforms and motorways of the sea are at the heart of a revolution in Mediterranean agricultural trade.

The new direction of flows, the power of the technology deployed, the peaceful nature of trade and above all, the advent of a new and more balanced political framework, at least in terms of a history where domination has prevailed, make this very ancient Mediterranean agricultural trade, a profoundly renewed activity.

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CHAPTER 2

THE DEVELOPMENT OF EURO-MEDITERRANEAN AGRICULTURAL TRADE AND NEW PROSPECTS

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In a context of global economic crisis and political, economic and social transitions in the Mediterranean, where the competition for natural resources is growing and making access to food more difficult, trade in agricultural products remains at the heart of cooperation between Europe and the southern and eastern Mediterranean countries (SEMCs), and broadly determines future relations between the two shores. Agricultural production and the development of trade sectors are also crucial factors for territorial development.

This chapter will firstly give an overview of trade in agricultural products between the European Union (EU) and the SEMCs, focusing on the core elements that have contributed to its structure (bilateral agreements, standards, etc.). A comparative analysis of the main Tunisian export sectors will then provide an introduction to the performance and current organisation of the sector, as well as constraints to their development at various levels (local, national and international), particularly in the field of logistics. Tunisia, the country that spearheaded political, economic and social change in the region, is the privileged theatre of the current and future challenges of Euro-Mediterranean agricultural trade. Finally, on the basis of the assessment established in the first two sections, the possible scenarios for trade in agricultural products between the two shores of the Mediterranean will be explored. A long term vision taking greater account of the interests of the SEMCs as well as those of the EU member states and more particularly the equitable development of agriculture local and regional levels in the countries to the south of the Mediterranean, continues to be a crucial prerequisite for the promotion of trade in agricultural products in the Mediterranean and the harmonious coexistence of its peoples.

The dynamics of Euro-Mediterranean agro-trade

Cooperation between the EU and SEMCs is marked in recent years by the proliferation of initiatives (Abis, 2013). The Euro-Mediterranean Partnership (EMP) was launched in 1995 following the Barcelona Declaration. In 2004, a European Neighbourhood Policy (ENP) was proposed in response to the new geographical situation in a European Union whose members had increased from fifteen to twenty-five. The Union for the Mediterranean (UfM), established in 2008, constitutes the most recent attempt to revive Euro-Mediterranean relations, which were struggling to develop at diplomatic level despite the plethora of projects and the existence of some encouraging sectoral cooperation programmes.

The Barcelona process has failed to achieve the expected results. "Originally perceived as intra-Mediterranean, Europe has developed Euro-Mediterranean marked by the signing and entry into force of bilateral trade association agreements (nine in total), granting asymmetrical trade benefits to the southern Mediterranean countries, depending on the state of play in bilateral negotiations and export structure" (Emlinger, 2010b). Although intra-Mediterranean trade is ultimately built around bilateral agreements between the EU and southern Mediterranean countries, the Barcelona process has not led to the emergence of regional or sub-regional blocks in the Mediterranean.

These bilateral agreements are differentiated and have developed depending on the date of the beginning of the negotiations but also on the political and economic situation of each country. The competitiveness of farming, products for export as well as the diversification of the economies of the countries concerned have also played a determining role as the negotiation agreements on industry were prior to those on trade in agricultural products (Comolet *et al.*, 2013). Several tariff protection mechanisms have been introduced, varying according to national production. The average tariff for agricultural products at European borders is of about 30 % and the quota system predominates in trade in agricultural products between the EU and the SEMCs (IPEMED, 2012). The level of customs duties varies for most fruit and vegetables according to the season. *Ad valorem* fees proportionate to the value of the product for certain specific items are applied at entry. The lower the entry price, the higher the specific duty (Emlinger, 2010a). Besides these tariff barriers, made even more restrictive by the introduction of an export calendar, non-tariff barriers are also imposed on exporting SEMCs.

The tariff reductions granted by the EU vary, however, by country and by product (Comolet *et al.*, 2013). The new agreements negotiated between the EU, Morocco and Egypt were based on the reciprocal opening up of borders to agro-food products on both sides of the Mediterranean, except for products in direct competition with those of the southern European countries (tomatoes, cucumbers, artichokes and strawberries in the case of Egypt). These agreements remain restrictive: as far as Morocco is concerned, although they allow tariff quotas to be removed or reduced (oranges and artichokes), they only apply for a given quantity. The *ad valorem* tax

is reduced, but at the same time, non-tariff measures are also imposed. In the case of Lebanon, an action plan was drawn up for 2013 to 2015, including the development of a national food safety system to ensure that products intended for export comply with European standards (see Box 1).

Box 1: Exports of Lebanese potatoes in accordance with EU standards

By the means of two agreements, Lebanon has implemented the first mechanisms to meet European requirements for plant protection for potatoes, to export a quota of 50,000 tonnes of potatoes to the EU. The gross revenue for farmers in Lebanon is estimated at between 17.5 million and 22.5 million euros. The first agreement, the EU-Lebanon Association Agreement, was signed in 2002 and ratified in 2006. It aims to: "a) provide an appropriate framework for political dialogue between the Parties, allowing the development of close relations in all areas they consider relevant to such dialogue; b) establish the conditions for the gradual liberalisation of trade in goods, services and capital; c) promote trade and the expansion of harmonious economic and social relations between the parties, notably through dialogue and cooperation, so as to foster the development and prosperity of Lebanon and its people; d) promote economic, social, cultural, financial and monetary cooperation; e) promote cooperation in other areas which are of mutual interest" (http://eeas.europa.eu/lebanon/docs/euro_mediterranean_agreement_en.pdf). The second agreement on the "Green Corridor" signed in 2003 between the Lebanese and Italian Ministries of Agriculture, is intended to facilitate the movement of agricultural goods between the two countries and boost future exports of agricultural produce from Lebanon to Italy and the rest of the European Union. Despite these agreements, Lebanon was still unable to export potatoes to the European market due to the lack of a structured monitoring system and harmonised legislation on harmful organisms requiring quarantine at exit/entry points and non-compliance with certain European regulations on monitoring, sampling methodology and traceability systems in particular.

At the official request of the Lebanese government, the Italian Ministry of Foreign Affairs financed the project entitled *Achieving European Standards for quality conformity of Potato production in Lebanon (EuLebPot)*, which was implemented by the Mediterranean Agronomic Institute (CIHEAM-MAI) in Bari and the Lebanese Ministry of Agriculture. To ensure the proper implementation of the EU-Lebanon Association Agreement and the Green-Corridor Agreement, the project focused on two strategic axes:

- The development of institutional capacity at national and regional level through a programme of technical assistance and training on best practices in the field (technical assistance for quality production and phytosanitary monitoring), but also on aspects of the legal framework and good laboratory management;
- The strengthening of the socio-economic aspects of the sector by promoting potato quality through a certification process available to all producers wishing to check whether their potatoes may be exported to EU countries, with higher added value.

Following these two strategic axes, the project has established operating procedures in compliance with the EU's phytosanitary regulations to ensure the rigorous monitoring of potatoes throughout the entire supply chain: entry and exit points (imported potato seeds, ware potatoes and exported ware potatoes), fields (inspection at the time of flowering and harvest) and facilities (warehouses and packing

plants). Under the project, 4,193 analyses and 1,975 inspections were conducted to detect the bacteria responsible for causing brown rot and ring rot in potatoes; laboratory protocols for detecting brown rot and ring rot were applied to tubers, soil and water in accordance with European directives 2006/56/EC and 2006/63/EC; an operational certification manual was developed for phytosanitary monitoring of potatoes, integrating data sheets on the main EU quarantine pests and technical workshops were organised between the Lebanese Chamber of Commerce and Italian potato importers. In addition, the project has established a traceability system designed on the basis of voluntary participation and able to monitor the entire supply chain (production, processing, distribution). The system was piloted during promotional campaigns conducted in a Beirut supermarket (Spinneys Hazmie).

At the end of the project, several reports with technical information on the production of potato and the phytosanitary situation in Akkar and the Bekaa (the main potato producing regions) for the 2008-2012 seasons have been sent to DG Health and Consumers (SANCO).

On 30 July 2013, the European Union has authorised member states to provide for derogations from certain provisions of Council Directive 2000/29/EC on potatoes other than seed potatoes from the Akkar and Bekaa regions in Lebanon (decision 2013/413/EU on http://eur-lex.europa.eu).

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Trade in agricultural products is complex, as it involves distinct infrastructure and logistical means controlled and managed by various operators from different areas. The logistical performance and distance which determine trade are included in the "border effect[1]" concept. A decline in logistical performance immediately triggers a change in the volume of products marketed when the border effect is limited (Emlinger, 2010a). A marked border effect, however, cancels trade elasticity as many logistical constraints hamper the rapid increase of trade (Emlinger, 2010a). Thus, poor logistical performance by the SEMCs in addition to internal barriers in the countries of destination do not encourage growth in exports from southern Mediterranean countries to the EU.

The SEMCs have not undertaken structural reforms such as land reform or the establishement of a system of adequate funding for the promotion of small-scale farming. Moreover, tariff and non-tariff barriers have also helped strengthen a model of development based on high value added crops consuming rare resources (water) and driving the hyper-specialisation of SEMC exports to the EU. The production of fruit and vegetables or off-season goods requires greater investment and more technology, and the excessive cost of such products prevents them from being marketed locally. Small-scale producers in the SEMCs, which contribute to food security are thus penalised, whilst operators with capital, including those associated with European companies, have managed to adapt their production and are able to export their products that comply with European standards.

1 - The border effect "corresponds to the advantage enjoyed by domestic producers over exporting countries; it includes the totality of costs linked to the fact of crossing a border [...] such as adapting to standards, health and logistical constraints and the cost of information" (Emlinger, 2010a).

All these constraints (complexity of trade in agricultural products, tariff and non-tariff barriers imposed by the European Union, lack of structural reforms and public policies in the countries concerned) have led to the structuring of capital-intensive industries in the southern Mediterranean, to the detriment of family farms and operators who do not have access to capital and natural resources. The pattern of trade in agricultural products between the SEMCs and the EU remains focused on immediate profitability of European agro-food chains. This situation is likely to persist, since the more vulnerable producers in southern Europe, who did not receive the same support as the one given to cereal farmers under the successive Common Agricultural Policies (CAP), (Tovias, 2010), will continue to put pressure on their respective governments.

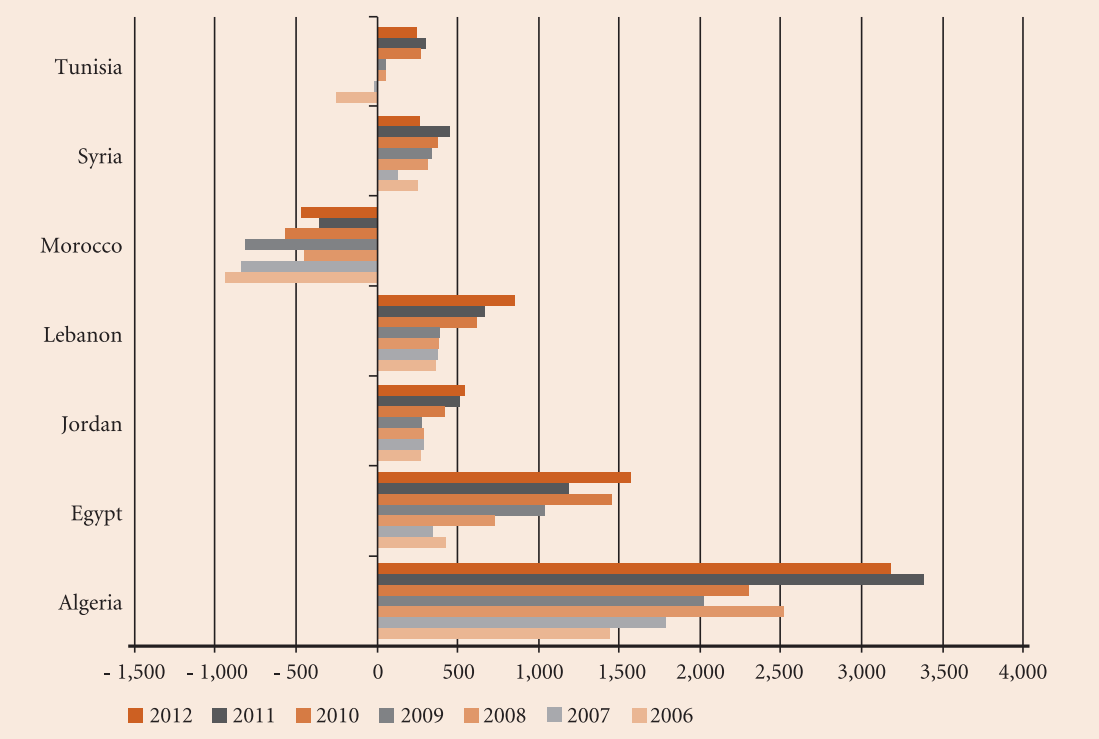
Whilst the production deficit caused by the exclusion of most small and medium-sized farms and operators restricts trade in agricultural products between the two shores of the Mediterranean, "non-Euromed agreements have boosted exports from the SEMCs to the EU, particularly in the case of Lebanon and Egypt" (Comolet *et al.*, 2013). Agreements involving high tariff barriers signed with other countries are thus generating positive effects on exports for some SEMCs.

Overall, SEMCs export fruits, vegetables, dates and olive oil and mainly import cereals. The balance of trade in agricultural goods between the EU and southern Mediterranean countries continues to be largely favourable to the EU (see Figures 1 and 2), except in the case of Morocco and Turkey (Emlinger, 2010b), which in 2012, have balanced their imports and exports (see Figure 2). Both countries are well endowed with natural resources and this makes their agricultural sectors relatively competitive, allowing them to export large quantities of agricultural products to Europe.

EU imports from southern Mediterranean countries, albeit constant in value, are two times lower than EU exports to the same countries, even though the goods exported by SEMCs are of high added value. With the exception of Turkey, Lebanon and Morocco, exports from SEMCs have not increased in quantity (SustainMED, 2012). Thanks to its high labour productivity and competitive products that comply with EU health and quality standards, Israel is without a doubt the only country whose exports to the EU increased (Emlinger, 2010a).

Europe mainly exports to Algeria and Turkey and the deficit in terms of trade in agricultural products continues to grow due to the increasing needs for staple foods and to fluctuating cereal prices on the international market (see Figure 1). Since European countries practice excessive prices, SEMCs are beginning to diversify their sources of supply, and increasingly turn to non-European and non-Mediterranean countries for their agro-food imports.

Figure 1 - EU agro-trade balance with the Arab Mediterranean countries (in millions of euros)



Source: Abis (2013).

Finally, the Mediterranean countries' export structure shows little diversification and intra-Mediterranean trade is stagnated at about 5 % of the total volume of trade in agricultural products (García Álvarez-Coque *et al.*, 2012). More specifically, Euro-Mediterranean trade in agricultural products is focused on an axis running from the Maghreb (Morocco, Algeria and Tunisia) to the European Mediterranean countries (Italy, Spain and France), given their geographical proximity. The Middle Eastern countries (Egypt, Lebanon and Syria), have on the contrary developed more substantial trade relations with the Gulf countries. Thus, in 2009, the Arab market constituted the leading destination for Egyptian agricultural produce (44% of Egyptian exports), while the EU is the second largest market (29% of such exports) (SustainMED, 2012). Trade in agricultural products has also intensified between Tunisia and Libya since the Arab revolutions. Substantial trade exchanges also take place between the Arab countries and North African and Middle Eastern countries in the framework of bilateral agreements established by the Council of Arab Economic Unity.

Besides the constraints inherent to the agreements negotiated between the EU and SEMCs, the trade imbalance between the two shores of the Mediterranean is partly due to the policies pursued by SEMCs, which have increased their dependence on the outside world for the supply of staple foods, due to the structural constraints hampering the dynamics of the various branches and to their inefficient logistical systems. However, although SEMCs are more interested in the bigger and better organised European market, trade in agricultural products with the neighbouring

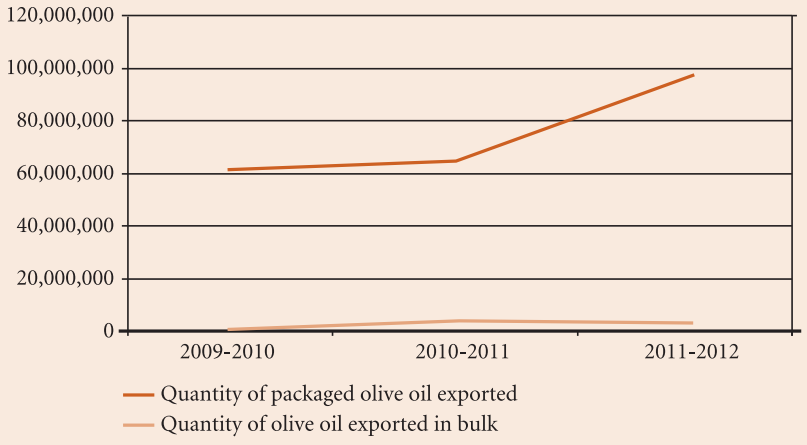
Arab states that do not impose restrictions in terms of quality and quantity can constitute a first step, opening the way for producers and operators to increase both their revenue and their investment capacity. A more in-depth analysis of the terms governing the export of the main Tunisian agricultural products (oil, citrus fruits, wine and dates) to the EU will help illustrate these points.

Tunisian exports of agricultural products to the EU and logistical issues

Olive oil

The quantities of Tunisian agricultural products exported to the EU sometimes exceed the allocated quotas. For example, the EU absorbs some 65 to 70% of the olive oil exported by Tunisia. From a total production of 160,000 tonnes of olive oil, 99,000 tonnes were exported to Europe during the 2011-2012 marketing year, largely exceeding the duty-free quota of 56,000 tonnes. Despite state aid, the amount of packaged olive oil exported is insignificant compared with the amount of olive oil exported in bulk (90% of oil exports, see Figure 2), bought mainly by Italy and Spain, the main producers in Europe, which use it to increase their exports or to bridge the deficit recorded after a poor harvest.

Figure 2 - Trends in the quantity of bulk and packaged oil exported (in kg)



Source: National Oil Board (2013).

Various types of barriers limit the access of Tunisian agricultural products to the EU market. In the case of olive oil, there are at least three different types. Firstly, any new importer to Europe must prove that he has imported olive oil for at least two years by paying high customs duties (1 euro per 5 kilos). Secondly, the export of olive oil to the EU is conditioned by monthly quotas corresponding to production periods in southern Europe[2]. Finally, additional storage-related costs (from April to September) undermine the competitiveness of Tunisian olive oil, despite the increased storage capacity now available amongst private operators, including in oil mills.

2 - 1,000, 4,000 and 8,000 tonnes per month between January and March, April and May and June and September respectively.

Faced with these conditions of access to the European market, Tunisian exporters adopt various strategies. Where the possibility of increasing exports and structuring the sector exists, as in the case of olive oil, private operators turn to other European countries as well as to the new growth markets of Asia (China and Malaysia[3]), Latin America (Brazil) and the United States. The growing exports of packaged olive oil are increasing the share of added value captured in Tunisia, which, however, remains limited (about 10% of exports) because bottling continues to be a costly operation.

As a further diversification strategy, Tunisia is exporting new products to traditional markets (essentially the EU). Exports of organic olive oil for example – a niche product – are on the increase, reaching 12,000 tonnes in 2010-2011. Yet these niche markets promise little growth since Europeans have their own brands. Furthermore, certification and production costs are two times higher than those of conventional oil.

The terms of pricing vary from product to product, determining the structure of the sector and the development of products. Export prices for bulk and packaged olive oil depend on the international market and the profitability of the sector is linked to difficult-to-control external events. When production is poor in Italy and Spain, for example, demand and prices rise. In fact, the international price determining export and production prices[4] is following a constant divergent trend. Since 2006, olive oil exports have been hampered due to the decline on the international market (see Figure 3). Operators have not managed to sell their oil at a higher price and thereby pay back seasonal loans. In Sfax, almost a thousand small oil mills have closed down, forcing many exporters into bankruptcy, following the government's autumn 2010 decision to stop granting seasonal loans. The demonstrations and general strike organised by the workers from the bankrupt oil mills on 12 January 2011 marked a turning point in the Tunisian revolution and were one of the instrumental factors behind the fall of the regime a few days later.

Figure 3 - Price trends for extra-virgin olive oil on the international market (in dollars per tonne)

Source: World Bank (2013).

3 - The price of packaged olive oil stands at 11 Tunisian dinars per litre in Malaysia.

4 - The export price stood at 3.43 Tunisian dinars (TND) per litre in 2012 and the production price will be 4.5 TND per litre in 2013.

Citrus Fruits

Tunisia does not reach its 40,000 tonne quota of citrus export to the EU. The added-value obtained by selling citrus fruits on the domestic market is higher than that obtained by exports, since domestic demand is not met. The amount, which has however increased between 2002 and 2007, does not exceed 5% of the production, which amounted to 350,000 tonnes in 2012. In addition, Tunisian citrus fruit exports are less diversified in terms of variety and destination: 90% of the oranges exported are of the small Maltese variety, a niche product dispatched mainly to the major French cities (Lyon, Paris and Marseille).

Market diversification appears unlikely in the citrus sector. Even within Europe, access to new markets such as Germany seems impossible as customers are put off by the relatively high price of Tunisian oranges. Given the specific nature of the exported product and the high competitiveness of Moroccan and Israeli oranges, the international price of "Tunisian Maltese" oranges is some 30 to 40% higher than that of other varieties (Navel), including from third countries.

Generally exported in boxes of 15 kg, Tunisian citrus fruits have to be repacked in France, sapping part of the added value to the detriment of local producers and exporters. Efforts are being made to diversify the packaging but they are still inadequate. Only 10% of the total exported amount intended for supermarkets is exported in Girsac nets weighing 10.7 or 2.5 kg.

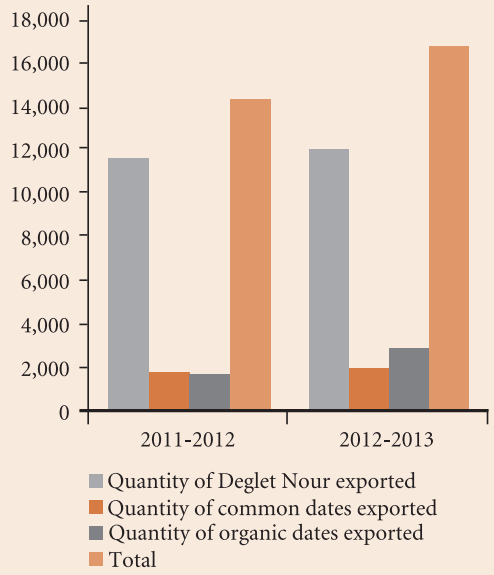
Dates

Between 65 and 70% of the dates produced in Tunisia are of the "Deglet Nour" type, a noble variety of high commercial value that is very popular abroad. 50 to 60% of total production, i.e. 96,000 to 97,000 tonnes of the 180,000 tonnes produced is exported. In ten years, i.e. from 2003 to 2013, the proportion of dates shipped to the EU fell from 70% to 45% due to the stabilisation of consumption and the diversification of export countries (see Figure 4). The new date exporters target the Asian, American and Moroccan markets, for which the amounts exported have multiplied 10 and 5-fold respectively over ten years. The export price depends on the quality of the product, this price being subject to the changing supply and demand on the international market and therefore negotiated between the importer and supermarkets[5] or distributors and exporters.

As in the case of citrus fruits, the date exporting industry has recently become structured. Over the last five years, thanks to state aid, refrigeration capacity has increased (100,000 tonnes) along with exporters' storage and preservation capacity, extending the export period from three to ten months (from October to August) corresponding to the period of Ramadan, whilst ensuring minimum quality. However, the gap between the growth rates for exports (about 8% per year) and production (about 3% per year), results in a loss of export quality. Tunisia would need to produce 300,000 tonnes of dates per year in order to ensure this quality, and the export share should not exceed 60% of domestic production.

5 - Tunisian dates are sold in France and Germany by the Carrefour and Métro brands respectively.

Figure 4 - Quantities of dates exported to the EU (in tonnes)

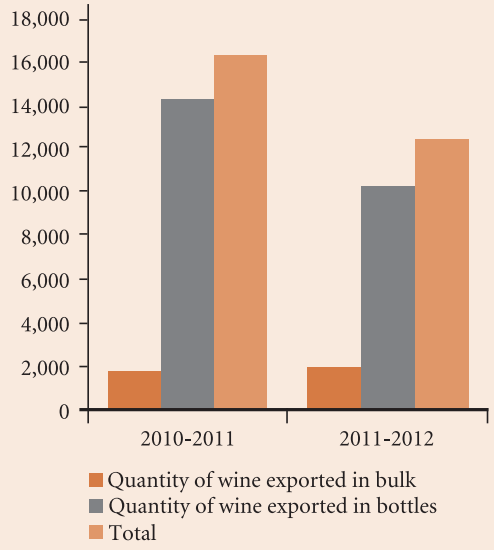


Source: GIFRUIT (2013).

Wine

Of a total of 120,000 hectolitres exported in 2012 and for a local production of 200,000 hectolitres (see Figure 5), Tunisia exports between 5,000 and 6,000 hectolitres of wine complying with quality standards (iron, SO2 etc. content) to the EU each year (mainly Poland, the Czech Republic, the Netherlands and Austria).

Figure 5 - Quantities of wine exported in bulk and in bottles (in hectolitres)



Source: GIFRUIT (2013).

The quantities of Tunisian wine exported to the EU do not meet the annual quota of 200,000 hectolitres (150,000 hectolitres in bulk and 50,000 in bottles). Nevertheless, there is a real potential for marketing in Europe, particularly in France, Italy and Spain, with Europe having a production deficit of 20% compared to consumption due to the policies imposed by Brussels (per hectare premiums to encourage grubbing-up of vines) and the recurrent droughts affecting Spain, Italy and south western France. Tunisia has managed to position itself in other markets (Canada, Russia, Nigeria and Morocco) to which it exports more than to the EU, albeit on a sporadic and fragmented basis.

As in the case of citrus fruits, the export price for wine is lower than the domestic price as local demand is not met. On the international market, Tunisian wine faces competition from wines produced in countries where agriculture is more productive. Thus, the CIF price (standing for *Cost, Insurance, Freight*,) for bulk Argentinean or Chilean wine bought by Italy and France for blending (colour and degree) stands at 70 euros per hectolitre because they have high yields. Tunisian wine, on the other hand, cannot be exported at a lower price than 100 euros per hectolitre due to the rising cost of wine grapes after the revolution (0.6 euros per kg) and low yields.

Box 2: The Bouargoub Winemaking Cooperative

The Bouargoub cooperative produces 20% of the volume of wine at domestic level. It has 80 employees, sells wine to hotels, restaurants and shops on a wholesale basis and runs a retail sales company. Despite a capacity of 100,000 hectolitre, it only produces 50,000 hectolitres of wine per year, its storage capacity being limited by a lack of tanks and pumps. Each year the cooperative exports between 2,000 and 2,500 hectolitres of wine. It has two packaging lines (4,000 and 1,500 bottles per hour respectively) running at 60% of their capacity since there are no specialised technicians to maintain them. Members sell their grapes at a fixed basic price and benefit from the redistribution of profits, that are of about 200 to 300 Tunisian dinars per hectare. The main constraints include the availability of corks and the lack of interest from European importers for new forms of packaging (cubitainer). The cooperative buys its bottles in Italy since the price of locally produced ones increased as a result of the wage claims following the revolution.

Meeting EU export quotas

Given the above-mentioned constraints, meeting EU export quotas constitutes the overall objective. To achieve this in the citrus fruit sector, it is necessary to invest in order to boost production, diversify export varieties, increase packaging capacity and adopt, very rapidly, the use of smaller packages in order to capture the maximum added value. With regards to the wine sector, Tunisia has the suitable land allowing it to develop the cultivation of wine grapes, a high added value crop. In order to increase the production of wine in general and expand the cultivation of wine grapes in particular, the infrastructure (vats, packaging equipment etc.) and transport logistics need to be modernised and a sectoral development policy incorporating incentives needs to be formulated.

In the olive oil sector, since production exceeds local demand, the EU export quota is easily met. However, due to the lack of a domestic market and the high cost of the various packing stations (supply, storage etc.), the value of packaged olive oil is limited. Furthermore, given the fluctuating international price, investing in the construction of packaging plants and oil mills is a somewhat risky venture. The establishment of a domestic fund to stabilise the price of olive oil would compensate operators when the international price falls below the domestic price and the cost of production. It would ensure greater profitability of the existing packaging units, the capacity of which would then be optimally used and ensure regular supplies to importing European countries.

The case of dates is different, since exports to the EU are not subject to any quota. Growth potential for the sector in Europe is limited as it is a niche market, even for organic dates. Given the water restrictions forecast for the south of Tunisia, exporters are unlikely to be able to continue supplying good quality dates in sufficient quantity in the years to come. Processing the dates locally into jams and syrups for the European market would be one possible solution for these products that have natural sweetening powers with no chemical additives. Small-scale processing plants could then be established and have a structuring effect on the entire sector. These plants would be supplied by producers at guaranteed prices, including for dates of local varieties. Conservation of biodiversity, job creation and thus economic growth and the development of economic fabric and trade to the EU are among the numerous potential benefits to this type of set-up.

The future of trade in agricultural products in the Mediterranean

SEMCs have two main objectives: obtaining a balance between exports and imports (i.e. a positive agricultural trade balance) and food security in order to reduce dependence on imports of staple foods, cereals from the northern countries in particular (including the EU). Their food and agricultural balance is currently in deficit, as shown in the table below for the past five years (2008-2012).

These two objectives are obviously difficult to achieve. As is proven by the Tunisian examples, the immediate solution would be to focus on products such as wine, citrus fruits and olive oil for which there is an export market share to be captured (including the EU). In the medium term, in order to ensure their food sovereignty, southern countries, where water and soil resources are scarce, will have to increase investment in agriculture and foster, in particular, the production of staple goods (cereals). In the long term, trade in agricultural products and the regulation of trade between the EU and SEMCs must be re-established within a global context of development and reduction of emigration. This is an acute necessity in the wake of the Arab revolutions and the repeated shipwrecks of makeshift vessels transporting migrants forced to take to the seas due to the failure of economic models deeply rooted in the global system and based on the use of cheap labour. The demands which emerged from the revolution to increase production prices and agricultural workers' wages, including in the processing, marketing/export and transport sectors, will be important in the fairer redistribution of the products of growth between the various branches of industry as evidenced by the wage increases in Tunisia in the agricultural and other related sub-sectors (regular workforce, workforce in the bottle-making factories, etc.).

Table 1 - Agricultural trade trends for the Arab Mediterranean countries with the world from 2008 to 2012 (in dollars)

		2008	2009	2010	2011	2012
Algeria	Exports	132,329,764	119,551,714	328,861,763	379,977,640	327,000,000
	Imports	9,098,000,000	6,994,732,000	7,350,364,891	11,375,839,903	10,755,000,000
	Balance	*– 8,965,670,236*	*– 6,875,180,286*	*– 7,021,503,128*	*– 10,995,862,263*	*– 10,428,000,000*
Egypt	Exports	3,217,359,287	4,568,717,113	5,122,004,968	5,162,001,719	4,738,000,000
	Imports	10,634,583,235	9,235,467,777	11,850,220,300	15,375,720,843	17,660,000,000
	Balance	*– 7,417,223,948*	*– 4,666,750,664*	*– 6,728,215,332*	*– 10,213,719,124*	*– 12,922,000,000*
Jordan	Exports	1,072,879,692	1,057,289,015	1,136,730,539	1,287,470,985	1,275,000,000
	Imports	3,042,744,962	2,574,031,599	2,682,179,136	3,186,784,046	3,603,000,000
	Balance	*– 1,969,865,270*	*– 1,516,742,584*	*– 1,545,448,597*	*– 1,899,313,061*	*– 2,328,000,000*
Lebanon	Exports	472,805,510	470,051,996	549,879,472	604,381,082	630,000,000
	Imports	2,437,730,517	2,778,534,915	3,230,046,839	3,413,177,434	3,426,000,000
	Balance	*– 1,964,925,007*	*– 2,308,482,919*	*– 2,680,167,367*	*– 2,808,796,352*	*– 2,796,000,000*
Libya	Exports	34,332,163	29,968,096	42,477,148	13,423,642	151,000,000
	Imports	2,287,276,757	1,731,643,832	1,818,226,023	865,821,916	5,063,000,000
	Balance	*– 2,252,944,594*	*– 1,701,675,736*	*– 1,775,748,875*	*– 852,398,274*	*– 4,912,000,000*
Morocco	Exports	3,743,650,302	3,292,665,589	3,693,711,653	3,396,952,965	3,928,000,000
	Imports	5,886,599,660	4,407,668,906	4,922,410,313	6,328,112,798	6,421,000,000
	Balance	*– 2,142,949,358*	*– 1,115,003,317*	*– 1,228,698,660*	*– 2,931,159,833*	*– 2,493,000,000*
Syria	Exports	3,318,010,375	2,378,849,682	2,995,961,960	1,717,271,628	908,000,000
	Imports	3,020,058,071	3,313,453,466	3,837,674,447	3,910,267,282	1,707,000,000
	Balance	*297,952,304*	*– 934,603,784*	*– 841,712,487*	*– 2,192,995,654*	*– 799,000,000*
Tunisia	Exports	1,807,421,408	1,405,089,915	1,405,992,770	1,504,143,610	1,931,000,000
	Imports	2,985,341,323	2,022,673,851	2,432,733,715	3,260,703,266	3,428,000,000
	Balance	*– 1,177,919,915*	*– 617,583,936*	*– 1,026,740,945*	*– 1,756,559,656*	*– 1,497,000,000*

Source: WTO, *Statistics Yearbook*, 2013 (compiled by S. Abis).

Increased exports of high added value products in southern countries and the fair distribution of profits to stakeholders in the various branches could trigger the creation of jobs, increase foreign currency exchanges, achieve an agro-food balance and restrict emigration. However, the increased dependence of SEMCs on the EU for the supply of staple foods has strengthened the trend towards bilateralism. The EU has given priority to short-term strategies such as asymmetrical bilateralism, notably by adopting an essentially commercial approach, especially since the prerequisites to the negotiations between SEMCs and the EU (such as reciprocity in removing subsidies on both sides, for example) never materialised as a result of the so far blocked negotiations on agricultural products within the WTO (Tovias, 2010).

Besides these structural constraints, sectoral negotiations between SEMCs and the EU are also lacking. The mutual and foreseeable effects of measures adopted are not analysed and taken into account. For example, the EU closes the market to agricultural produce from the Maghreb. At the same time, however, it helps these countries solve their problems following the opening up of the industrial market and the dismantling of the multi-fibre agreements, which placed large sections of their economies (the textile sector in particular) in direct competition with the economies of the emerging countries with their highly productive industrial apparatus and where the cost of labour remains low. (Tovias, 2010). The inter-relations and interactions between the various sectors at the heart of cooperation between the EU and SEMCs should be analysed. The impact of the various measures on each of these sectors should be assessed with the aim of increasing the efficiency of trade between the EU and SEMCs and rationalising the use of resources while the economic crisis persists.

Unequal trade in agricultural products between the EU and SEMCs threatens to undermine the sustainability of an already precarious partnership. The countries of the southern shore are being forced to seek new trade partners. "The approach aimed at integrating SEMCs within globalisation is greater than that of regional integration, leading to a loosening of Euro-Mediterranean relations" (Abis, 2012a). "A review of the historical trends in trade between SEMCs and European countries and the long-term simulation of their evolution show that the "cost of the non-Mediterranean" is relatively low" (Comolet *et al.*, 2013).

Trade in agricultural products is complex and bilateral agreements cover different fields of intervention and implementation. The analyses we have just conducted show that two levels of negotiation exist with the EU. Political and strategic negotiations, which can only be successful if SEMCs join forces in sourcing their cereals and, by extension, ensure the opening up of European markets; and concrete negotiations on bilateral trade between the EU and each country (Tovias, 2010).

In practice, the political cooperation between the EU and SEMCs conducted so far has been limited to the agricultural and agro-food sectors in order to establish bilateral free trade agreements. No long-term approach based on an analysis of the key development issues in these sectors in the Mediterranean has been considered. In the past, the EU has not encouraged the establishment of agricultural development strategies in SEMCs, fearing competition for its own agriculture. It has, on the contrary, favoured national policies to fight against climate change, a global phenomenon

with adverse effects on Europe, but which does not appear as a priority in SEMCs (PEV, Tunisia, 2013). Agriculture, however, was recently brought back onto the cooperation agenda after the 2008 food crisis and the Arab revolutions. In order to increase the efficiency of trade, the EU is planning reforms to assist southern Mediterranean countries in aligning themselves with European transport standards and strengthening maritime cooperation, seeing a reciprocal interest therein.

Box 3: The ENPARD programme

The European Neighbourhood Programme for Agriculture and Rural Development (ENPARD) reinforces cooperation between Europe and southern Mediterranean countries and promotes local development in rural areas. It represents the testing ground for a new approach based on stakeholder participation in the development, promotion of individual and collective initiatives and participatory democracy within the framework of a pilot phase before the programme's activities are implemented in the countries concerned (Tunisia, Egypt, Jordan). The sustainable control of natural resources by the local population determines the dynamics of territorial development and, by extension, of the creation of wealth and investment and underlies job creation. Organising industry at territorial level in such a way as to maximise the share of added value captured by local stakeholders presupposes the coexistence of two types of governance bodies:

1) A representative executive body with resources, responsible for the implementation of the territorial strategy reflecting the shared vision of stakeholders and for the monitoring of the implementation of collective and individual projects of various types (agricultural, agro-food, eco-tourist and infrastructure), to develop territories and strengthen social cohesion therein; 2) An inter-professional body responsible for controlling that a greater share of added value reaches local inhabitants and thereby guaranteeing a fairer distribution of wealth. Localised production sectors must constitute the basis for trade in agricultural products between southern Mediterranean countries and the EU. Inter-professional structures could also take part in the negotiations alongside representatives of the state (DUE Tunisia, 2013).

Prospective analyses propose the combination of various elements that determine increased trade in agricultural products between the EU and SEMCs, based on changes in food consumption, climate change and changes within the available workforce and level of education (MEDPRO, 2012). These elements, however, are not sufficient to explain the low levels of productivity or to allow the establishment of realistic models. More specifically, they take no account of the unequal access to natural resources, that hampers the development of profitable agricultural activities and limits farm investment due to a lack of incentives and access to loans. It is precisely these obstacles that undermine production and curb the development of these sectors that constitute the basis for fairer agricultural trade between the EU and southern Mediterranean countries.

Structural reforms alone aimed at increasing production and labour productivity would not only generate an agricultural surplus in SEMCs that could be marketed (also abroad) but also create industrial units able to absorb the manpower rejected by increasing mechanisation in agriculture. With the failure of multilateral

cooperation in the Mediterranean area, the EU would benefit from encouraging cooperation with sub-regional entities, including trade in agricultural products. Furthermore, better integration of trade in agricultural products between SEMCs would generate growth where economies are diversified (Comolet *et al.*, 2013). Finally, European strategy currently consists of multiplying partnerships with other parts of the globe, sometimes very remote. New agreements have been signed between the EU and Singapore, Colombia and Central America. Others are already in force, as with Peru, South Korea, Mexico and South Africa. Negotiations were initiated with Canada, India, Malaysia, Vietnam and several countries in Africa, the Caribbean and the Pacific (Abis, 2013). The conditions for the implementation of these new agreements will certainlty affect trade in Euro-Mediterranean agricultural products.

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CHAPTER 3

SUB-SAHARAN AFRICA AND THE ARAB WORLD: DISCONNECTED AGRICULTURAL REGIONS

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Trade relations between Arab and Sub-Saharan African countries have a long history. Despite the geographical constraints, they have established strong ties since the 9th century thanks to a flourishing trans-Saharan trade of various food and non-food goods. During the colonial period, these economic and trade links have loosened, as the majority of the colonised African countries had to meet the demand of European countries for raw materials. Starting in the 1950s, the independence of these African countries was marked by a resumption of Arab-African relations promoting economic, social and cultural solidarity, which was crystallized on the non-aligned movement.

These relations rapidly ran out of steam from the 1980s onwards under the effect of the economic crisis and chronic political instability. Since then, each of these regions has found a way out of the crisis, primarily by developing trade partnerships with Europe leading to the establishment of the Euro-Mediterranean and Euro-African free trade areas. More recently, Arab and African countries have progressively developed economic and trade relations with Asian and other emerging countries.

Despite trade agreements and on-going political dialogue, notably within regional institutions of a political, economic, cultural or religious nature, the relations between Arab and African countries do not form part of a strategic framework likely to foster trade and economic integration. Moreover, despite a significant African diaspora in the Arab countries (especially in the Maghreb and the Gulf States) and an Arab diaspora in the African countries, Lebanese in particular, their presence does not significantly contribute to building mutual trade relations.

Arab and African economic areas are completely disconnected, especially with respect to agriculture, since they are both exposed to a growing risk of food insecurity. This risk is in part and only temporarily alleviated in certain Arab countries thanks to oil and gas revenues.

The weakness of agricultural trade between Sub-Saharan African and Arab countries simultaneously results from the disparity of economic systems, the structural crisis in agriculture, the lack of proactive trade and an inadequate transport infrastructure. As a major factor leading to the marginalisation of these economies from global economy, the logistical deficit also hinders any regionalization process.

For all that, since recent years, there are financial and productive dynamics that contribute to a greater integration of agricultural regions. The increasing investment flows from the Arab countries to Sub-Saharan Africa favour the development of agricultural trade, better agricultural land use and the internationalisation of the processing industries. What lies behind these flows? Are they part of a coherent and strategic approach? Are they sustainable? Do they have a structuring effect to stimulate the integration of agricultural and economic regions?

Firstly, the agricultural trade between the Arab and Sub-Saharan African countries, the structural crisis which characterises their agriculture, and the factors behind the disconnection between these regions, especially the logistical deficit will be put into perspective. The agricultural complementarities and the still fragile (and reversible) nature of the factors underlying them will then be analysed.

Agricultural trade and the structural crisis in agriculture

Since the 1980s, the declining contribution of agricultural production in Sub-Saharan African and Arab countries to satisfy the populations' food requirements results from both the dysfunctional structure of agricultural activity, the deregulation of markets and the marginalisation of rural areas.

Limited agricultural trade

In 2011, Sub-Saharan Africa, North African and the Middle East accounted for 18% of the world population and 15.1% of world agricultural trade. However, although it is growing steadily, bilateral trade accounted for 0.3% of this world trade, showing that these regions are both little integrated.

The Arab-African region is particularly dependent on the global market (see Table 1). On the one hand, its food needs are hugely reliant on global imports. In 2011, only 6.3% of North African food imports came from the Arab-African region (10.6% for the countries of the Near and Middle East, and 18.7% for the countries of Sub-Saharan Africa). On the other hand, their food exports within this area were respectively 59.6%, 62.5% and 77%.

Table 1 - Exports of food goods by destination in 2011 (in millions of current dollars)

	North Africa[1]	Near & Middle East[2]	Sub-Saharan Africa[3]	World
North Africa[1]	1,132.3	2,473.9	1,183.1	**11,852.1**
Near & Middle East[2]	502.0	3,043.9	342.9	**10,360.3**
Sub-Saharan Africa[3]	889.8	2,108.1	7,664.6	**46,261.2**
World	**39,030.9**	**71,730.0**	**46,516.1**	**1,485,240.5**

1. Algeria, Egypt, Libya, Morocco, Tunisia.
2. Including South Africa.
3. Bahrain, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen and Occupied Palestinian Territories.

Source: CHELEM (CEPII) online database (https://chelem.bvdep.com/).

Although relatively low, bilateral trade in food goods between the Arab countries and Sub-Saharan Africa has increased steadily over the last ten years (see Table 2). Agricultural exports from the countries of North Africa and the Near and Middle East to Sub-Saharan Africa increased annually by an average of 21.3% and 15.9% respectively between 2001 and 2011. They increased eight-fold for the former and five-fold for the latter. Imports from Sub-Saharan Africa increased to a lesser extent.

Table 2 - Annual growth rates of exports of food goods by destination, 2001-2011 (%)

	North Africa	Near & Middle East	Sub-Saharan Africa	World
North Africa	14.2	21.2	**21.3**	12.7
Near & Middle East	15.1	8.9	**15.9**	10.0
Sub-Saharan Africa	7.9	16.5	**12.2**	10.1
World	13.6	13.4	**14.8**	10.2

Source: CHELEM (CEPII) online database (https://chelem.bvdep.com/).

Bilateral trade is characterised by a strong concentration of agricultural products. Three types of products (sugar, animal and vegetable conserves and cereal products) account for three quarters of exports from the North African countries to Sub-Saharan Africa (see Table 3). In addition, Arab countries are increasingly exporting fertilisers and, to a lesser extent, agricultural equipment.

The structure of the bilateral trade has not changed over time and is asymmetric overall. The Arab countries export transformed food products and fertilizers while the Sub-Saharan African countries export products with less added value (raw

materials, unprocessed agricultural products), which are more sensitive to external shocks (especially the volatility of world prices). This structure leads to a deteriorating trade, to the detriment of the African countries.

Table 3 - Evolution of exports from the Arab countries to Africa (in millions of current dollars)

	North Africa		Near & Middle East	
	2001	2011	2001	2011
Cereals	26.8	27.3	3.5	31.2
Other agricultural products	5.1	76.8	19.4	54.7
Non-food agricultural products	2.6	86.5	11.2	19.3
Cereal products	**22.9**	**197.7**	**7.7**	**19.6**
Fats	6.6	110.7	4.6	25.1
Meat	1.4	26.4	3.6	94.3
Animal conserves	**52.7**	**237.7**	**2.1**	**1.8**
Vegetable conserves	4.4	61.8	4.5	27.1
Sugar	**14.1**	**264.8**	**5.7**	**41.6**
Animal feeds	0.04	3.7	0.3	13.6
Drinks	3.2	81.2	3.9	10.4
Manufactured tobacco	0.3	7.8	0.3	3.7
Total Agro-food	**140.5**	**1,183.1**	**67.2**	**342.9**
Agricultural equipment	0.4	4.4	3.5	12.1
Fertilizers	**9.7**	**169.8**	**73.4**	**442.6**

Source: CHELEM (CEPII) online database (https://chelem.bvdep.com/).

The agricultural intensity of bilateral trade flows is considerable, since 22% of exports from North African countries to Sub-Saharan Africa consist of food goods (see Table 4). The agricultural intensity of exports from Sub-Saharan African countries to North African countries is almost 30%. Oleaginous, fruit and livestock dominate these exports. Among non-food goods, exports of hides and leather account for significant flows.

Although on a similar scale, trade between the countries of the Near and Middle East and those of Sub-Saharan Africa are more unbalanced. Exports of oleaginous products, fruit and livestock yielded a trade surplus of 1.8 billion dollars for Sub-Saharan Africa in 2011. Imports from the Near and Middle East countries very largely consisted of energy and petrochemical products (fertilisers).

Table 4 - Share of food exports in total exports in 2011 (%)

	North Africa	Near & Middle East	Sub-Saharan Africa	World
North Africa	13.9	26.2	**22.0**	6.4
Near & Middle East	3.7	5.5	**1.4**	0.9
Sub-Saharan Africa	**29.8**	**21.0**	**13.9**	**10.6**
World	19.7	11.4	**12.3**	8.3

Source: CHELEM (CEPII) online database (https://chelem.bvdep.com/).

Regional trade factors determine the structure of this bilateral trade. This regionalisation can be explained by geographical proximity, the similarity of consumption patterns and also the perishable nature of products. Intra-regional trade is more developed between the countries of Sub-Saharan Africa (8.2% of total trade) than between the countries of North Africa and the Middle East (5.3% of total trade) whose dependence on foreign markets is greater.

Arab-African agricultural relations are dominated by two major axes consisting, firstly, of trade between the countries of the Maghreb (especially Morocco) and the countries of West Africa (especially Ivory Coast, Senegal and Gabon) and, secondly, between the Gulf States and the countries of southern Africa (South Africa) and east Africa (Ethiopia, Kenya and Tanzania). The tradition of trans-Saharan trade, an important vector of commercial integration of the Arab and African world for a long time, began to run out of steam at a time when relations between Europe and the southern and eastern Mediterranean Countries were being redefined and the nature of trade changed when the Sahel countries became sunk into the mire of under-development (see Box 1).

Box 1: Trans-Saharan trade runs out of steam

The historic relations between the African and Arab countries are rooted in a tradition of trans-Saharan trade. Dating back to the 9th century B.C., this trade reached its peak from the 13th century to the end of the 16th century, before declining with the European colonisation of Africa. The products traded were very varied: North African countries supplied jewels, cloth, dates and wheat while the Sahel countries supplied amber, salt, Arabic gum and hides. Nowadays, this trade mainly consists of food goods (dates, livestock, groundnuts, etc.) (Lugan, 2001). Agricultural trade between North African and Sub-Saharan African countries reached almost two billion dollars in 2011. Given the importance of informal cross-border trade of food goods to the Sahel countries and transiting through them, the volume of this trade is certainly under-estimated.

However, in recent years, desertification, the rural exodus, poor border controls and regional political instability have brought changes in the content of this trade in the Sahel region, with a progressive substitution of trade of food goods by transit channels of illegal goods (cigarettes, drugs, arms, etc.).

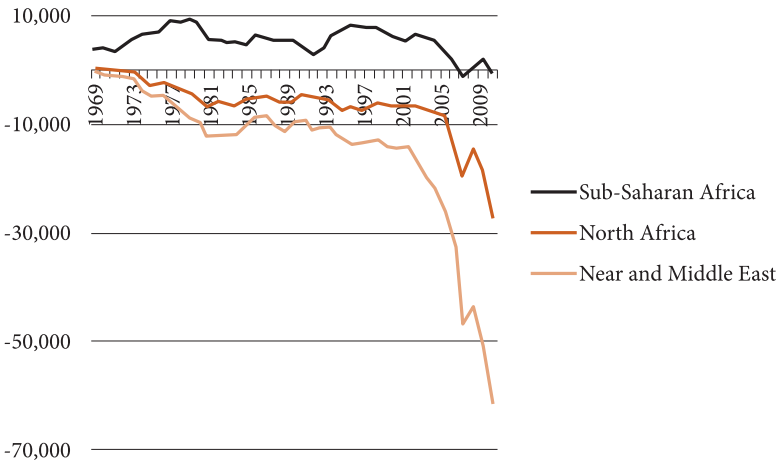
Agricultural crisis and food dependency

The weakness of agricultural trade between Sub-Saharan Africa and the Arab countries fundamentally results from the structural crisis in agriculture in both sub-regions. According to estimates of the United Nations Food and Agriculture Organization (FAO), agricultural imports of the Arab countries are expected to double between 2000 and 2020. This trend appears to be the result of demographic growth, climate change and improvements in living standards. Less pronounced trends are observed in the African countries.

First of all, strong demographic growth during recent decades has exacerbated the imbalance between population and available resources. The growth in agricultural production has remained below that of demographic growth, leading to a reduction in *per capita* agricultural production (World Bank, 2008). This finding is particularly evident in those Arab countries where the agricultural trade deficit has deteriorated. Indeed, this deficit has increased five-fold since the early 1980s, rising to some 30 billion dollars in North Africa and over 60 billion dollars in the Near and Middle Eastern countries (see Figure 1). This food dependency is particularly strong in terms of cereals as these countries are among the biggest global importers. The rise in the agricultural deficit in recent years partly results from sharp rises in world cereal prices and monetary factors (the depreciation of the dollar led to a corresponding fall in the value of their exports).

Despite a significant deterioration, the agricultural trade balance remains generally in equilibrium in Sub-Saharan African countries. Nevertheless, as soon as their food needs begin to rise faster than domestic production capacities, these countries will also experience a structural deficit in the agricultural trade balance.

Figure 1 - Evolution in the trade balance of agricultural products (in millions of current dollars)



Source: CHELEM (CEPII) online database (https://chelem.bvdep.com/).

In both regions, agricultural imports are rising more rapidly (by volume and by value) than exports. The strongly growing ratio of imports of food products *per capita* reached 54 dollars in Sub-Saharan Africa in 2011, 232 dollars in North Africa and 325 dollars in the Near and Middle East. The recourse to imports to satisfy food needs has partially replaced domestic production, signalling a worrying situation of food insecurity.

The structural weaknesses in the agricultural systems are quite similar. The combined effects of trade liberalisation, increased production costs (especially the rise in the price of land, energy and inputs), and the constant decline in farmers' purchasing power have led to the formation of a dual system. On the one hand, modern farmers engage in investment and agro-industrial activities targeting foreign markets and are organised in a few export chains; on the other hand, small family farms dominate subsistence agriculture.

Subsistence agriculture occupies three quarters of the cultivated land[1] and accounts for a very large part of agricultural employment. It is characterised by very low productivity, rudimentary farming methods, limited access to finance, opaque markets, sales outlets in scattered urban markets and inefficient organisation of branches (farmers lack organisation and bargaining power in dealing with traders and intermediaries). Moreover, this agriculture is marked by great poverty and mass rural exodus.

These structural weaknesses have led to a declining contribution of agriculture to the GDP, although it continues to employ a considerable part of the population. Agricultural investment in the Arab countries does not exceed 0.3% of GDP, compared to 3% in the developed countries. Agriculture continues to account for some 27% of total employment in the Arab countries and almost half in the countries of Sub-Saharan Africa (see Table 5).

Table 5 - Comparative indicators of agricultural activity

	Sub-Saharan Africa	North Africa and Middle East
Rural population (%)	64	41
Agricultural land (%)	44.7	23
Added value (% of PIB)	12	10.5
Agricultural added value per worker (constant dollars, 2000)	322	2,626
Share of total employment (%)	49	27
Coverage rate		
Agro-food goods	99.4	20
Cereals	11.5	3.6

Source: World Bank online database (2013) (http://data.worldbank.org/).

1 - Over 96% of farmers in Sub-Saharan Africa cultivate less than 5 hectares (World Bank, 2008).

The factors of disconnection

This summary of the trade and structural dynamics reveals the low level of integration of Arab and African agricultural regions. The restrictive nature of their trade agreements and the inadequate quality of transport infrastructure hinder any physical and institutional links.

Restrictive trade regimes

Sub-Saharan Africa and the Arab countries have engaged simultaneously in regional trade integration (through inter-African or inter-Arab free trade agreements) and in trade integration with the developed countries (through free trade agreements or economic partnerships, in particular with the European Union, the United States and certain emerging countries).

Both these regions are also bound by several trade agreements, the effects of which, however, do little to facilitate trade and investment promotion appears to be somewhat limited. Moreover, these agreements do not define a specific bilateral framework for agricultural products, and their entanglement is not part of a coherent trade policy designed to promote the comparative advantages of countries or support selective sectors of production.

These variable-geometry agreements are of the following types:

- Multilateral agreements, which involve the granting of mutual tariff preferences for traded goods which satisfy the conditions of origin within the framework of WTO agreements or the Generalized System of Preferences;
- Regional agreements between certain Arab countries and African regional groups, such as the Common Market for Eastern and Southern Africa (COMESA), the Economic Community of West African States (ECOWAS), the Southern African Development Community (SADC), the Central African Economic and Monetary Community (CEMAC), the West African Economic and Monetary Union (WAEMU) and the Southern African Customs Union (SACU). These provide for total or partial exemption from import duties for specified lists of products;
- Bilateral agreements, which involve the reduction of customs duties, increased quotas, facilitation of investment, and the adoption of sanitary and phytosanitary standards.

In practice, the slow and incomplete implementation of these agreements results in the continuation of restrictive trade systems, especially for agricultural products. Some African countries fear a negative impact of excessive competition from products coming from some Arab countries with a farming tradition and tend to maintain a high level of protection. In addition, there is a powerful temptation to maintain customs revenues, which constitute a major part of these countries public income.

Furthermore, while these agreements provide for a substantial lowering of customs barriers and the reduction of some non-tariff barriers, trade barriers are still high.

Administrative requirements, such as import certificates and quality control, add considerably to transaction costs and thus affect exporters' competitiveness. Similarly, the complexity of tax systems impedes trade. For example, some bilateral agreements make the granting of tax reliefs subject to compliance with the direct transport rule. In addition, when a product transits through a third country, it no longer benefits from the preferential regime.

In addition, beyond words, at this stage, trade integration between Sub-Saharan African and Arab countries is not a strategic priority for both regions. Only the Maghreb countries, Morocco in particular (see Box 2), are trying to develop their economic and political relations with Sub-Saharan African countries (Alaoui, 2010).

Box 2: Morocco, an offensive economic diplomacy

In the last decade, Morocco is the Arab country that has pursued the most ambitious policy of cooperation with African countries. Apart from debt cancellation measures for the benefit of the least developed countries, Morocco has concluded trade agreements with 17 African countries, which provides a total exemption of their products from customs duties on their entry in the Moroccan market (Ministry of the Economy and Finance (Morocco), 2012). At the same time, the Moroccan authorities are actively encouraging investment in the banking, insurance, transport, civil engineering, water, electricity and education sectors. Agriculture does not seem to be a priority of this economic diplomacy.

Inadequate quality of transport infrastructure

Goods transport infrastructure is unevenly developed depending on the country, and in some cases it reaches international standards (Dubai, Richards Bay, Tanger-Med). In the last few years, many Arab and African countries have embarked on a programme of transport reform and modernisation.

However, agricultural trade between the Arab countries and Sub-Saharan Africa uses fragmented means of transport, leading to slow and discontinuous flows of goods:

- Air transport is marginal because of its high cost. Airfreight services are little developed and can only be used for certain small cargoes of perishable early fruit and vegetables and foodstuffs. The current liberalisation of air transport is more likely to have an impact on passenger transport.

- Rail transport is little used because of the limited coverage of national rail networks and lack of interconnections between countries. Mainly managed by public corporations, rail networks, are generally old with obsolete equipment. Rail transport in Africa is primarily reserved for passengers and mining products. The use of container transport is little developed.

- Road transport is mainly used for national communications or links with neighbouring countries. However, because of the poor quality of roads, or at least their variable quality, there are considerable delays and costs for food products where

the turnover rate is inherently high. The proliferation of tiny road haulers, the age and poor quality of the fleet, the low level of investment capacity, the lack of regulations (social and tax regulation, non-applied technical and safety standards) and the strong competition from the informal sector contribute to transport additional cost and this affects the competitiveness of national producers. Several projects for the modernisation of road infrastructure are in progress to strengthen the countries' continental links[2].

- Maritime transport remains the predominant means of transport[3] for agricultural products. Long characterised by archaic structures, maritime transport is confronted with many bottlenecks (concentration of traffic in a small number of ports, shortage of container terminals, inadequate and obsolete equipment, excessive bureaucracy, failure to comply with international standards, transhipments, little integration of information systems, lack of competition in port management and lack of competition in dock services) which lead to additional costs and significant transit delays. Nevertheless, in recent years, port infrastructures have been marked by major reorganisations driven by massive public investments and the mobilisation of private investment. Several current projects should expand port capacity. On the African continent, several operations of concessions to private operators (Algeria, Togo, Guinea and Cameroon) or extensions of container terminals (South Africa, Egypt, Morocco, Tunisia, Kenya, Mozambique and Tanzania) have begun. These projects should increase the growth potential of these countries and are particularly targeted at Sub-Saharan Africa to increase capacity for export of raw materials.

Nevertheless, the African ports (see Table 6), whose growth potential is fairly low, are constrained by a problem of critical mass, which limits investment in increased capacity and turnover. With the exception of some South African and North African ports, the tonnage is relatively low and dominated by mining products.

In the Arab-African region, the countries with the highest port capacity are the United Arab Emirates (15.1 million TEU[4] of containers in 2010), Egypt (6.7), Saudi Arabia (5.3), South Africa (3.8) and Morocco (2). Current projects should increase the port capacity of Doha by 2014 to 12 million TEU of containers, Tanger-Med to 8 million and Durban to 6 million. Only these ports, due to their capacity for imports and exports of goods, might be in a position to participate significantly in international maritime transport.

2 - Several projects supported by international institutions are intended to develop a network of trans-African roads to strengthen inter-African trade corridors. With a length of 56,685 km, this network will include nine roads along four East-West axes: (Cairo-Dakar; Dakar-Djibouti; Dakar-Lagos-Mombasa; Lobito-Beira) and three North-South axes (Algiers-Lagos; Tripoli-Cape Town; Cairo-Cape Town).

3 - Over 80% of world trade is carried by sea and is largely polarised among the developed countries. South-North flows are dominated by raw materials and South-South flows are still limited. The Euro-Mediterranean region accounts for some 30% of international maritime freight and some 20% of maritime oil transport (Plan Bleu, 2010).

4 - TEU: twenty foot equivalent unit. Sources: World Bank (2012), UNCTAD (2011).

Table 6 - Principal African ports

Ports	Countries	Millions of tonnes	2011/2010
Richards Bay	South Africa	89.2	+ 5.5%
Durban	South Africa	80.7	+ 6.1%
Saldanah Bay	South Africa	59.6	+ 11%
Alexandria	Egypt	45.3	– 8%
Port Said	Egypt	39	+ 6%
Tanger-Med	Morocco	27	+ 17.4%
Damietta	Egypt	27	– 6.5%
Skikda*	Algeria	26.6	+ 27%
Casablanca*	Morocco	23	+ 15.9%
Mombasa	Kenya	19.9	+ 5.4%
Jorf Lasfar*	Morocco	16.7	+ 19.7%
Abidjan	Ivory Coast	16.6	– 26%
Cape Town	South Africa	13.8	+ 4.8%
Bejaia	Algeria	13.6	+ 7%
Port Elizabeth	South Africa	11.8	+ 7.1%
Mohammedia*	Morocco	11.4	+ 14.2%
Dakar*	Senegal	11	+ 17.7%
Tema	Ghana	10.8	+ 24%
	Nigeria	82.7	+ 10.7%
	Mozambique	19	+ 35.7%

* In 2010.

Source: *Atlas 2012 des enjeux maritimes*, University of Nantes, ISEMAR, *Le Marin*.

High logistics costs

The World Bank estimates that the logistics costs of the North African countries amount to an average of 20% of the GDP. This cost is likely to be even higher in Sub-Saharan Africa, while it is estimated at between 10 and 16% in the European Union and between 15 and 17% in the emerging countries (Mexico, Brazil and China). The poor logistics performance in the Arab-African region is the result of inadequate transport infrastructure as well as poorly diversified logistics services (related to the management of physical flows of goods and information flows). This situation affects the competitiveness of these economies and acts as a barrier to their inclusion in international goods transport chains.

This situation brings about additional transport and transaction costs[5] as well as long delays in the transfer of goods (see Table 7). Overall, the inaccessibility of areas of agricultural production increases the delivery and export delays of agricultural products. Similarly, the transit of imported goods is cumbersome. The World Bank estimates the time between importation (from the point of unloading of goods to their reception by the recipient) at an average of 7.2 days for Arab countries, 7 days for Sub-Saharan Africa and only 2.8 days for European countries.

This constraint is even more critical for perishable agricultural goods, which require the optimisation of the logistics chain. For example, in the fruit and vegetable sector, maintaining the cold chain plays a key role in preserving the quality of products between harvesting and sale as well as in the long-term conservation of products. Interruptions of the cold chain reduce the value of the goods or even cause their loss (El Khayat, 2011).

Table 7 - Cost of transport of a 40-foot container (in dollars)

	Export cost		Import cost	
	Port/airport*	Road**	Port/airport	Road
Algeria	1,000	–	2,000	–
Egypt	773	1,097	1,123	1,392
Morocco	500	1,118	500	1,118
Tunisia	250	–	250	–
Saudi Arabia	506	932	1,225	410
Lebanon	672	1,145	975	1,285
United Arab Emirates	495	626	618	743
South Africa	1,861	1,442	2,000	1,732
Nigeria	1,261	500	1,587	3,000
Ivory Coast	1,000	–	1,145	474
Senegal	–	–	1,310	–

* Transfer of goods from point of origin (factory) to port or airport.
** Transfer of goods from point of origin (factory) to buyer's warehouse.

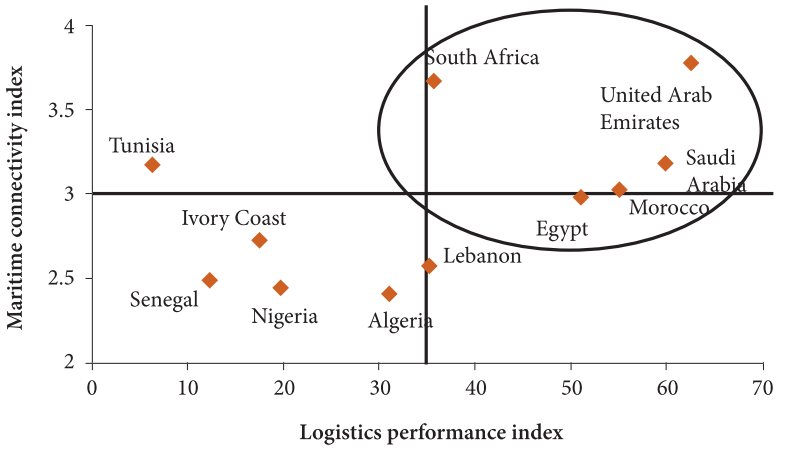
Source: World Bank (2012).

The lack of coordination and professional training of those involved in the chain (producers, exporters/importers, shippers, logistics services providers, and various public supervisory bodies), the lack of integration of modes of transport (lack of multimodal transport), administration of complex tax regimes (related to

5 - In African and Arab countries, the cost of insurance is higher in order to take account of the greater uncertainty and higher risk.

international transport which is subject to an array of fiscal charges), the lack of information and data transmission systems, the opaque and excessive bureaucracy (customs, physical and financial controls) and the lack of rigorous and constant enforcement of compliance with regulations are listed among the many logistical shortcomings (sources of conflicts and delays in transit) (FEMIP, 2010; UNCTAD, 2011).

Figure 2 - Logistic performance index and maritime connectivity index



Sources: Adaptations of the author, based on World Bank data (2012) and UNCTAD (2011).

The logistics performance of nations is primarily measured by two indicators: the logistics performance index proposed by the World Bank and the maritime connectivity index produced by the UNCTAD. The superimposition of these indicators for the principal countries in the Arab-African region reveals that five countries have a high level of performance (the United Arab Emirates, Saudi Arabia, South Africa, Morocco and Egypt). Morocco is one of the countries, which have recorded the most rapid progress in the last few years in the world ranking of logistics performance (50th in 2012 against 113th in 2007) and in the maritime connectivity index (18th in 2011 against 78th in 2004).

These countries can become regional hubs for logistics. In a perspective of greater involvement of Arab and African countries in international trade, and taking into account the constraints of delays and transport costs, these trends prefigure a regional organisation of goods transport. These countries could become maritime goods transport hubs, especially in terms of transhipment for transit to other ports. Nevertheless, the risk of overcapacity of infrastructure at regional level cannot be ruled out and the proliferation of over-sized transport infrastructure could lead to a loss of profitability and dumping practices.

The pursuit of agricultural complementarities

The disengagement of the State is probably a major factor contributing to a structural agricultural crisis in Arab and African countries. Neglected with the adoption of structural adjustment policies in the 1980s, public agricultural policies have been

rendered ineffective in most of these countries. Since the food crisis in 2007-2008, some countries in the Arab-African region have realized the extent of their food insecurity and are trying to revive agriculture, but in a way which does not fit within a regional policy or a strategic approach to agricultural complementarities.

These agricultural complementarities mainly rely on available land and financial resources. In the first place, while the saturation of agricultural land in the Arab countries is intensifying, Sub-Saharan Africa still has unexploited land reserves. The surface area of fallow land is the most extensive in the world. Inadequate investment in production, land fragmentation and the predominance of subsistence agriculture have led to the stagnation of land and production. Secondly, the effects of climate change and the exhaustion of water resources are a more powerful constraint on agriculture in the Arab countries, limiting intensive agriculture in regions with a high water deficit. Lastly, structural inertia and the shortage of agricultural investment weigh heavily on African countries' capacity to do anything more than export unprocessed agricultural products. On the other hand, the pressure of international competition in the Arab countries should encourage them to greater extraversion of their agricultural processing industries.

The pressures on these two areas of agriculture, especially in recent years, have encouraged financial and productive dynamics, which could benefit from the integration of agricultural regions. The demands of food insecurity could lead to an acceleration of investment in countries where land capacity and agricultural potential are still high. According to the FAO, Africa has 60% of the world reserves of land and only 20% of these reserves are actually farmed. In this sense, Africa is the region where the growth in arable land will be the strongest, while anthropic pressures are likely to lead to a reduction of such land in the Arab countries.

This divergence partly explains the current movement towards land acquisition in Africa (especially East Africa and West Africa) by public and private Arab investors (mainly from the Gulf). At present, this trend has not been properly evaluated and only imperfectly outlined thanks to the opacity and the variety of transactions (ranging from long-term capital acquisition of land to profit-seeking investment in agricultural production)[6]. Yet although there is a call for their development, these financial flows could produce two contradictory impacts.

On the one hand, they tend to reinforce the financial, economic and agricultural interdependency of Sub-Saharan African and the Arab countries. The comparative advantages of African land (price of land, quality of soils, abundant water resources, and surplus labour) and the cash surpluses in some Arab countries could lead to investment in agricultural land, coupled, if necessary, with public investment, thus allowing the modernisation of farms, a better agricultural productivity, the construction of rural infrastructure, the creation of skilled and less-skilled jobs and the development of trade.

6 - See Observatory of agricultural land (http://www.landportal.info), and Abis and Cusi (2010) for a review of profit-seeking investment by Arab countries in agricultural land.

On the other hand, these financial flows raise at least three questions: 1) The maintenance of African countries' sovereignty over agricultural land for which long-term concessions are granted to foreign operators; 2) The social conditions of land exploitation and the real impacts on local rural populations; and 3) The preservation and sustainability of the land subject to intensive farming.

The pressures of international competition, especially that of European producers, is intensifying as the Arab countries reduce the protection of their agricultural production (mainly in the framework of Euro-Mediterranean trade agreements). Moreover, non-tariff barriers in European markets are still high. This situation encourages some producers in the Arab countries to reduce their supply costs by importing more raw materials from Sub-Saharan Africa[7] to direct their exports more to the African countries, or re-locate part of their production capacity there.

These productive trends contribute to a strong development of the growth potential of the African market, while fostering a diversification of exports of food and non-food goods to Africa. Apart from processed products (conserves, oils, etc.), trade could gradually extend to sectors with growth potential (fruit and vegetables, cereals). In addition, the intensification of investment in petrochemicals and engineering in the Arab countries in recent years could also strengthen the exports of fertilisers and agricultural machinery (tractors, harvesters, presses, etc.).

In this sense, agro-food groups (especially in the Maghreb) seem to be opting for vertical productive integration strategies in order to diversify their sources of supply upstream while increasing their local production and marketing capacity downstream (see Box 3).

Box 3: Agricultural investment of the Maghreb in Africa

The three main private industrial groups in the Maghreb are increasingly committed to internationalising their activities. The African market seems to be a new priority.

In the agro-food sector, the creation of the first subsidiaries seeks to strengthen outlets in the African market. Through its subsidiary Lessieur Cristal, the Moroccan ONA Group has acquired 36% of the capital of the Tunisian company *Raffinerie Africaine* to increase its production and export capacity of table oils in the continent. Also seeking external growth, the Tunisian Poulina Group, through its subsidiary Med Oil that exports over 70% of its production (margarine, vegetable oil) to Sub-Saharan Africa, has formed a subsidiary in Senegal to develop local production and marketing capacity.

More recently, the Algerian group, Cevital, plans to invest in four countries (Sudan, Ethiopia, Tanzania and Ivory Coast) to farm several hundred hectares for the production of corn, rice, wheat, oleaginous, legumes, beetroot and sugar cane and to develop local processing units (oleaginous pressing, rice processing, refining and manufacture of animal feeds). This production would be destined for both the local and the Algerian markets. Furthermore, Cevital could eventually expand its investment into the field of logistics (an agro-industrial complex in Abidjan, Port of San Pedro).

7 - Imports of raw materials, primarily from Europe and Latin America, weigh heavily on the production costs of agro-food businesses.

These financial and productive dynamics contribute to the generation of added value in each of the two regions and act as driving forces for the integration of agricultural areas. Nevertheless, they are insufficient and more related to an opportunistic behaviour. Essentially, they result from the desire of States to reduce their food insecurity or that of enterprises to develop export niches. Moreover, they are hypothetical unless they are integrated in proactive agricultural policies designed to improve the competitiveness of producers and structural policies allowing the modernisation of goods transport infrastructure and cooperation policies, which encourage trade and investment between Sub-Saharan African and Arab countries. The development of potential agricultural complementarities is still exposed to powerful constraints. More fundamentally, the question of agricultural relations between Sub-Saharan African and Arab countries raises the question of their future pathway in a globalised world. Their political choice is rather one of self- integration into the European space, a policy the articulation of Arab-African relations is not considered.

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CHAPTER 4

AGRO-TRADE DYNAMICS OF THE BLACK SEA COUNTRIES

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In the past few years, the increase and volatility of agricultural have become a major threat to global food security, particularly for food importing-countries including southern and eastern Mediterranean countries that heavily depend on international markets. Nonetheless, as long as the flows of exports to these deficit areas are conducted under good conditions, exporting countries can properly develop their potential.

The Black Sea countries (Russia, Ukraine and Romania) and those of Central Asia (mainly Kazakhstan with part of its territory in Europe) are among the countries expected to increase their exports. These countries in transition already play an increasingly important role in global food markets and some of them, including the major cereal exporters like Kazakhstan, Russia and Ukraine, have the potential to contribute to greater food security. Today, Egypt has become a very important market for Russian and Ukrainian grain.

This upturn in the trade in agricultural products between Black Sea countries and countries of the MENA region deserves further consideration. The case of Turkey will not be developed here as it is specifically addressed elsewhere in this report *Mediterra*.

Russia: the return of a giant

Since its re-establishment within the community of nations, Russia has made the Mediterranean region one of its geostrategic priorities, as was already the case in contemporary history. Many Russian experts are now putting forward the scientific concept of "Greater Mediterranean" that includes the Middle East and the Black Sea region. The forceful return of the Russian fleet to the Mediterranean in 2008 reflects Moscow's will to consolidate its position in the region, with which it already has strong economic ties especially in the energy and tourism sectors.

Russian agriculture can be one of the main axes of this strategy. With its very deep, humus-rich chernozems and its agricultural revival thanks to the state aid allocated to cereal producers and private investment, Russia has already reclaimed its position

as the third major cereal exporter. Based on a long-standing investment policy, Russia intends to make cereal production the spearhead of a food power that would be particularly useful in a strategic region like the Mediterranean. Another advantage of this strategy is the fact that since 2005, the quality of Russian wheat has improved thanks to major investment in farms and silos (new handling and drying equipment). The increased protein content of this wheat constitutes a real threat for French wheat, which hitherto dominated the North African market. However, the implementation of the policy to support the grain sector faces two obstacles: the state monopoly on transport infrastructure and political favouritism vis-à-vis some players of the Russian cereals market.

The return of Russia can be measured in terms of the market share it holds in the region's grain sector. The Middle East absorbs a third of Russian cereal exports with Egypt being by far, the leading world customer, followed by Saudi Arabia and Iran. Since 2011, Bahrain has also become a regular importer of Russian cereals. Among Arab Mediterranean countries, besides Egypt, both Tunisia and Morocco are also regular customers while in southern Europe, Italy, Spain and Greece are the main importers of Russian grain.

Russia is planning to increase its exports of processed products such as flour, to the Middle East. It should also expand its range of food products for export to include high added value commodities. This would allow the promotion of the development of the country's processing industry. In return, Russia imports fruit and vegetables from Arab Mediterranean countries and the Middle East (see table 1).

Table 1 - Russian imports of fruits and vegetables from the Mediterranean and the Middle East

Country	Fruits and vegetables
Tunisia	Olive oil, dates
Jordan	Cucumbers and gherkins, tomatoes, fresh grapes, fresh apricots, fresh peaches, olive oil
Syria	Fresh cherries, peaches, apricots, plums, figs, citrus fruits, tomatoes, cucumbers and gherkins
Lebanon	Tobacco, cherries, fresh grapes, fresh lemons, citrus fruits
Algeria	Dates (fresh and dried), canned fruits
Morocco	Mandarins, oranges, grapes, tomatoes, peppers, bell peppers, potatoes, flour, semolina, fish balls, shellfish
Egypt	Citrus fruits, potatoes, medicinal plants

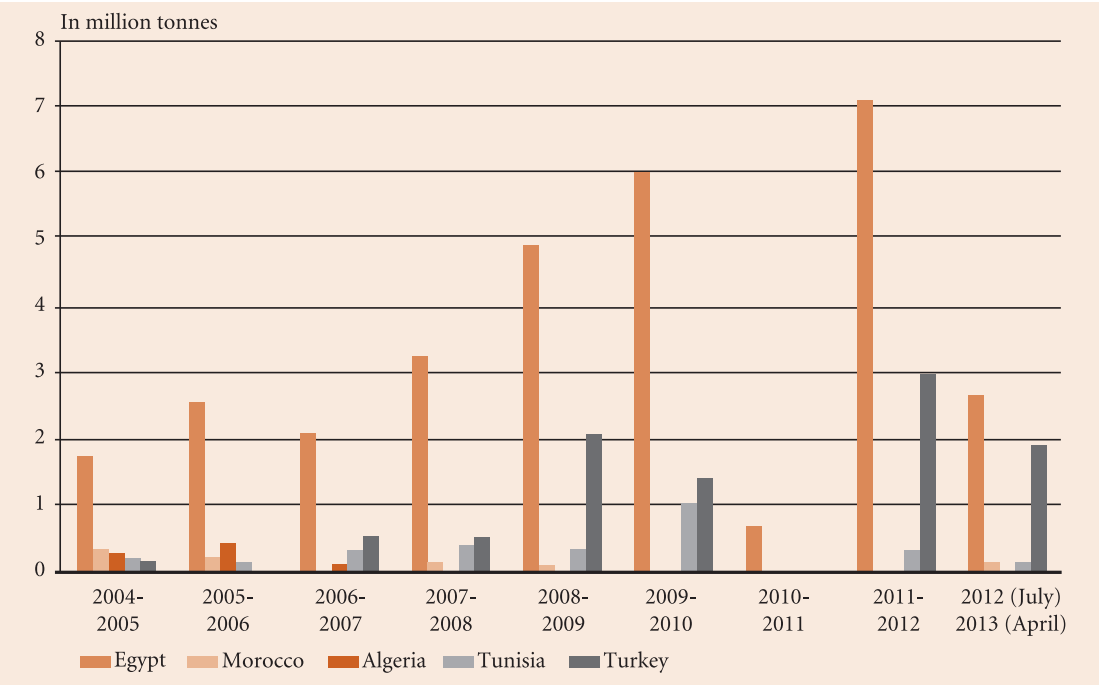
Source: FranceAgriMer.

The Maghreb, Morocco in particular, is the leading importing region of Russia's fruits and vegetables. At the end of 2011, the Danish company Maersk Line has

opened a direct container route between Morocco and Russia called the "MARUS Express", which reduces the transit time between the ports of Agadir and Casablanca and Saint Petersburg (the Petrolesport terminal). It now takes between 8-9 days as opposed to 12-16 previously. Three reefer ships with a total capacity of 800 twenty-foot equivalent units (TEUs) and 200 refrigerated containers provide the weekly container transport. This innovative service mainly devoted to citrus fruits, is also used to transport tomatoes. The reduction of delivery times obviously allows a lower final price, thus improving the competitiveness of exporters (under the previous transport conditions, a quarter of tomato shipments was often damaged).

The fact that a large percentage of Russian fresh fruits and vegetables imports is currently transported by sea helps to stimulate the development of Russian port infrastructure. More broadly, the country is experiencing a real transport revolution. The 2030 strategy launched by the Russian Federation is aimed at the integration of the country into the international transport system through the development of logistics infrastructure and multimodal forms of transport linked to national and international transport corridors.

Figure 1 - Russian wheat exports



Source: FranceAgriMer and International Grains Council.

These developments can be measured at the regional scale. The Southern Federal District has a significant agricultural and logistical potential. Comprising six Russian federal units (the Republic of Adygea, the Republic of Kalmykia, the Krasnodar Territory and the regions of Astrakhan, Rostov and Volgograd), it covers 420,900 km^2 and occupies the southern part of the Eastern European Plain, the northwest of the Caspian Plain and the western part of the Caucasian mountains. Besides its

favourable conditions for agriculture (plains and climate), this region is an exceptional location for Eurasian transport, due to the presence of the Volga River - Caspian Sea and Trans Siberian-Black Sea routes linking the countries of the Asia-Pacific region (China, Korea and Japan) to the Mediterranean countries. Russia's foreign economic relations with the countries of the Black Sea, the Caspian Sea and the Mediterranean Sea are therefore ensured by the Southern Federal District. This is why the efforts made by the Federation are focused on this region.

More specifically, exporting its products to more than one hundred and thirteen countries, the Rostov region, located around the Sea of Azov and leading to the Black Sea, is quite dynamic in terms of international trade. It should be noted that, with the exception of the Central European Initiative (CEI), agricultural products and raw materials account for half of all these exports, the main importers in descending order being Turkey, Switzerland, Italy, Egypt, Saudi Arabia, the Islamic Republic of Iran and Israel. Several axes of development are planned in the rail transport sector, which has long been one of Russia's priorities. The main objectives are to increase the transport capacity of major roads (Moscow-Novorossiysk, Volgograd-Kotelnikovo-the ports of the Sea of Azov and the Black Sea basins) and to reconstruct the Tuapse-Adler railway line.

Four priorities have also been established in the field of maritime transport sector, i.e. developing port stations and port access routes in the Taman peninsula; modernising the water transportation hubs of Astrakhan, Rostov and Azov, which should lead to an increase in freight handling capacity from 32 to 34 million tonnes per year; construction of transhipment facilities in the port of Taman, whose export capacity are expected to reach 90 million tonnes per year and the establishment of ferry lines for transportation to the Black Sea and Caspian Sea countries.

As for river transport, the region plans to create routes on the river Don and Volga. The project to double the capacity of the Volga-Don canal, located in the Southern Federal District aims at increasing the traffic of goods in the development of the international transport corridor number 7 connecting the Danube to the Volga.

Moreover, Russia seeks to develop a transit hub in the Mediterranean, which would be equipped with modern grain elevator with a capacity of 125,000 to 150,000 tonnes, unloading and transhipment facilities as well as cleaning, fractionation and drying equipment. Thus hub will be constructed in one of the shallow water ports in Greece or Cyprus (Piraeus, Thessaloniki, Patras, Limassol, Larnaca, etc.), or the Israeli ports of Ashdod or Haifa. Once arrived at the port, the Russian grain would be sorted, processed and then shipped to customers around the world (Mediterranean region, Africa, Asia, Western Europe, etc.). This would compensate the lack of berthing facilities in the ports of Novorossiysk and Tuapse, which is currently limiting the access of large ships. In geopolitical terms, the alliance of Russia with countries such as Greece, Cyprus or Israel would ensure stability in a region that is currently facing major tension.

Box 1: Towards an OPEC[1] for cereals?

In October 2013, Russia, Ukraine and Kazakhstan signed an agreement binding them within a common cereal pool that currently represents 21 % of the global surface area for wheat and 29 % for barley, i.e. 14 and 21 % respectively of the world production. Given the possible rise in productivity, these proportions are likely to increase. Meanwhile, these three countries already account for 20 % of world trade in cereals, Ukraine is the largest cereals exporter, just ahead of Russia, and Kazakhstan further behind. This idea of a *pool* was initially expressed in 2004 by an ambitious Russia before it was re-launched in June 2009 at the World Cereal Forum in Saint Petersburg.

This agreement reflects the wish to have a greater influence on world markets, to reduce price volatility and to ensure market transparency, thereby attracting investors. This grouping does not introduce competition, since each of the three countries develops its own cereal specialisation – Kazakhstan produces high quality wheat, Russia's wheat is of a lower quality and Ukraine essentially produces fodder wheat. The three governments have agreed to create a structure that will manage all cereal exports. In 2013, the *pool* responded to a Moroccan call for tenders, offering more attractive prices (less than 15-20 euros per tonne) than their main competitor, France.

Within a future advisory body, recommendations may be issued on the regulation of the grain market and cost control. The *pool* is also considering the establishment of a common logistics system for the transportation of cereals. Particularly well located in the region, Ukraine seeks to increase its cereal transhipment capacity and to optimise its transit infrastructure through the mediation of the Nibulon company, which has bought several elevators along the country's main rivers. The country has established its own fleet of sea-river vessels and is developing river transport as an alternative to road and rail. Nibulon also intends to invest in sea-river transport in Russia and Egypt.

Ukraine and its granary

The agro-food industry is of great importance for Ukraine. The country has a strong potential in terms of grain, probably even higher than that of Russia in terms of exports. Its production capacity can be reasonably estimated at 100 million tonnes per year, against 130 to 140 million tonnes in Russia, but with a population that is three times smaller than that of Russia (48 million inhabitants in Ukraine compared with 150 million in Russia). Composed of a vast plain of over 100 kilometres from east to west and 600 kilometres from north to south, the country has 41 million hectares of chernozems in the vast Dnieper basin. With the arrival of foreign capital already underway leading to a strong agricultural capitalisation, Ukraine would establish itself as a new *food power* in the Mediterranean. Highly interested in this potential, China has already provided 1.5 billion dollars in aid of the development of Ukrainian agriculture. Under an agreement signed in 2013 between the two countries, the Ukrainian state-run grain company GPZKU agreed to export 2 million tonnes of wheat to China. Egypt, Saudi Arabia, Iraq and Jordan are currently the leading customers of Ukrainian cereals. Moreover, in the framework of the previously mentioned agreement with China, the Chinese National Electrical Engineering Company (CCEC) will purchase

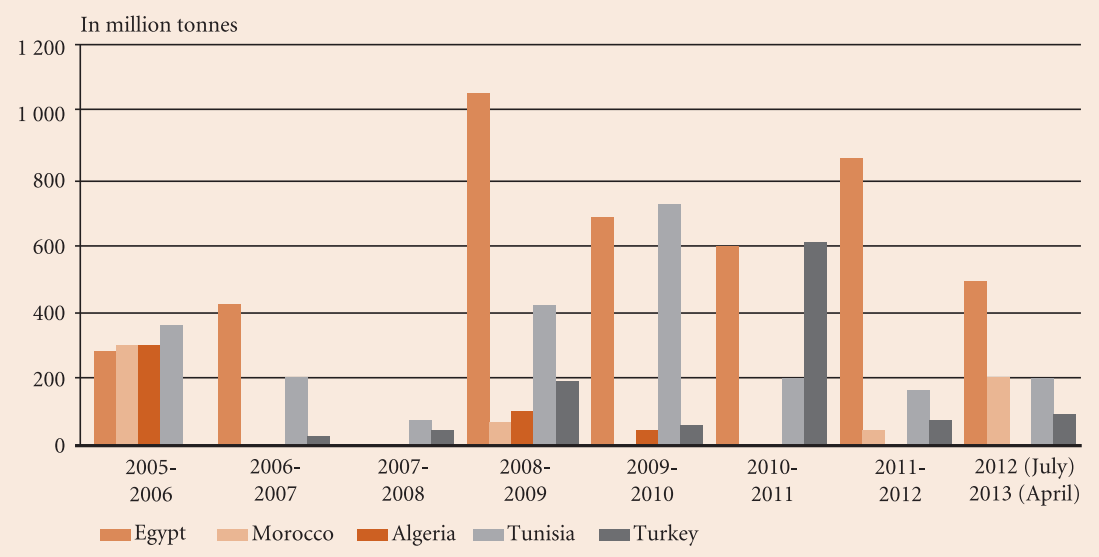
1 - Organization of Petroleum Exporting Countries (Translator's note).

Ukrainian wheat to subsequently re-export it to the Middle East (75,000 tonnes to Egypt and Syria, 25,000 tonnes to the Mediterranean region).

Ukraine is therefore becoming a key player in Middle Eastern and Mediterranean markets. It even became one of Morocco's main suppliers during the 2012-2013 season. Consuming almost 5 million tonnes of cereals each year, Morocco is a structural importer since, depending on meteorological conditions, it purchases between 1 and 3.5 million tonnes per year, received via Casablanca. The country sets high quality standards for potential suppliers – baking value (W) must be above 160 and protein content higher than 11 %. The significant increase in the quality of Ukrainian cereals over the last ten years and more rapid transhipment in the Black Sea region may lead to an increase in the volume of contracts between the two countries in the near future.

It should be noted that Ukrainian corn exports have soared in 2011-2012, exceeding 15 million tonnes and tripled compared to the previous marketing year. Ukraine has thus exceeded Argentina and Brazil to become second largest corn exporter in the world, behind the United States, with major destinations in North Africa, the Middle East and the European Union.

Figure 2 - Ukrainian wheat exports



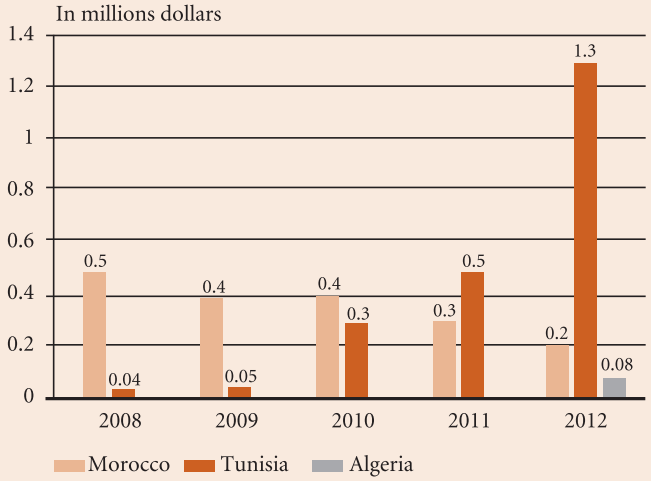
Source: FranceAgriMer and International Grains Council.

Like Russia, Ukraine is a major importer of fruits and vegetables from North Africa and Turkey. The majority of fruits come from Tunisia (and not from Morocco, as is the case of Russia), whilst Turkey accounts for an ever-increasing share of the Ukrainian vegetable market.

Increasing openness to trade provides Ukraine with some interesting margins of manœuvre in logistical terms. If, like Russia, the country modernises its port infrastructure, the current economic situation generated by the budget deficit and debt does not allow a public management investment policy. Ukraine is resolutely turning

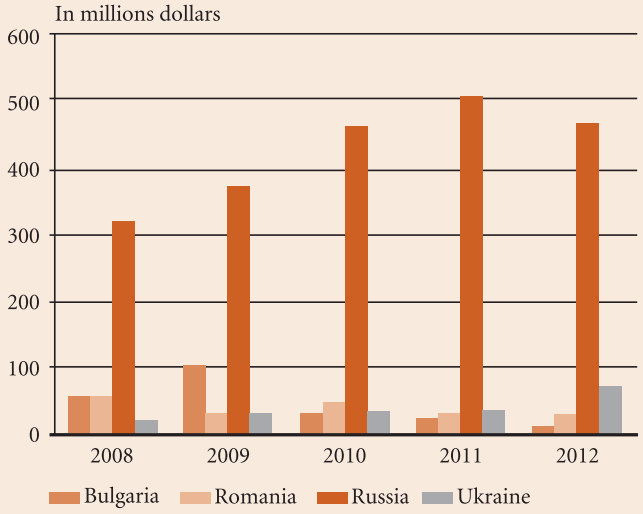
towards private investment. Foreign-owned companies are currently the leading exporters in Ukraine and are the ones that invest in port infrastructure. Exporters seek, in particular, to reduce costs by constructing their own transhipment terminals to compensate delays in deliveries and cases of corruption. In 2011, two new cereal terminals were built in the ports of Kherson and Nikolayev. Intended for the export of cereals to Egypt, the second silo at the port of Kherson (with a 3 million tonne loading capacity) has been designed to deal with a volume of about 350 tonnes per hour by rail and 300 tonnes per hour by road. Three other ports (Illichivsk, Odessa and Yuzhne) play an essential role in the import-export trade and the flow of goods in transit or coming from Ukraine. No less than seventeen Ukrainian seaports handle over 40% of freight.

Figure 3 - Fruit imports towards Ukraine



Source: FranceAgriMer and Eurostat.

Figure 4 - Turkish vegetable exports



Source: FranceAgriMer and Eurostat.

Kazakhstan: the green ambitions of an oil-producing country

Central Asia has become the scene of a geopolitical game over access to energy resources and control of transport and communication channels. Turkey, Iran, Pakistan, India and also Kazakhstan are among the protagonists. In recent years, Kazakhstan has been striving to develop its economy, particularly the agricultural sector. Favoured by the country's energy resources, this will to power is conditioned by the improvement of the logistical infrastructure. In 2007, Kazakhstan has established a modern industrial complex in the port of Baku (Azerbaijan), capable of processing 150 tonnes of flour per day and producing 50 million tonnes per year. The country has become the world's leading flour exporter. It mainly exports to neighbouring countries including Kyrgyzstan, Tajikistan, Uzbekistan and Afghanistan.

Kazakhstan wants to go even further by expanding its market, especially by ceasing to depend on Russia and Ukraine for the transportation of cereal. Since the costs of other transport routes remain quite high, half of the 10 million tonnes of cereals exported in 2012-2013 passed through the Russian and Ukrainian ports. However, the completion of the construction of the railway connecting Turkey with Georgia, the transportation costs of Kazakh cereals to Turkey should shortly be divided by three (from 135 dollars per tonne to 41 dollars). The country also relies on the construction of the Tbilisi-Kars railway in 2013-2014 and, at the same time, the opening of the Kazakhstan-Iran rail link, via Turkmenistan, which should allow almost 3 million tonnes of cereals to be transported per year. The port of Aktau on the eastern shores of the Caspian Sea is the only seaport in Kazakhstan designed for international freight.

Kazakhstan's main market, Turkey, is particularly interested in the high protein content of Kazakh cereal for the production of pastries (chocolate, sweets and semi-processed products), exported in large quantities all over the world, to Arab countries in particular. In 2012, for example, the Turkish company Elvan Gıda, has increased its exports to Egypt by 300 % compared to 2011, while the overall exports to the Middle East have reached 35 million dollars. The total exports of Turkish pastries to Arab countries have increased by 30 % since 2012, estimated at 2.5 billion dollars in 2012 (against 2.05 billion dollars in 2011).

Box 2: The Black Sea Economic Cooperation Organisation

Created in 1992, the Organization of the Black Sea Economic Cooperation (BSEC) appears to be reviving after years of procrastination. The BSEC is a regional association established in twelve countries (Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Serbia, Turkey and Ukraine) and whose headquarters are situated in Istanbul.

The BSEC aims to strengthen economic cooperation between its member states, to improve the free movement of goods, capital, services and labour and to integrate these countries into the global economic system. Its initial objective was to establish a "free trade zone" and gradually construct transport corridors.

However, with the advent of the crisis in 2008, most projects of the BSEC were on stand-by. Since 2011, it seems that cooperation is reactivated, particularly driven by the activism of Russia, that sees this as a means to increase its influence as a hub region, particularly turned towards Europe and its energy market. For their part, Turkey and Ukraine consider the BSEC as a structure that could strengthen their position in the framework of their accession negotiations with the European Union.

Being a strategic area for oil and natural gas, the region has high potential for growth. Within the framework of the BSEC, the member countries are also striving to develop an integrated transport system (rail and motorway) around the Black Sea and the Sea of Azov, with access to seaports and major economic centres. This cooperation should allow the countries of the region to obtain favourable prices for imported products and to expand their export marker share.

Romania: finally living up to its promises

With its vast plains and highlands, Romania has a strong potential for agriculture and livestock. In transition towards a market economy since the land restitution of 1991, since then, the country has experienced no significant changes in land tenure or in the transformation of agricultural structure. The 14 million hectares of agricultural land are still shared between 4 million farms, 99 % of which have less than 8 European size units (ESUs). Semi-subsistence and subsistence farms account on average for 40 to 50% of Romanian domestic production. According to estimates, 30% of the consumption of a Romanian family is home-produced. This rate rises up to 80 % in rural areas, where agriculture remains the main activity for one third of the population. Nevertheless, Romania does not renounce to the objective of becoming self-sufficient, particularly for the much-appreciated pork and poultry, whose production is made easier by the availability of cereals on the domestic market. For cereals and oilseeds, which together account for 83 % of arable land, the aim is to conquer new export market shares.

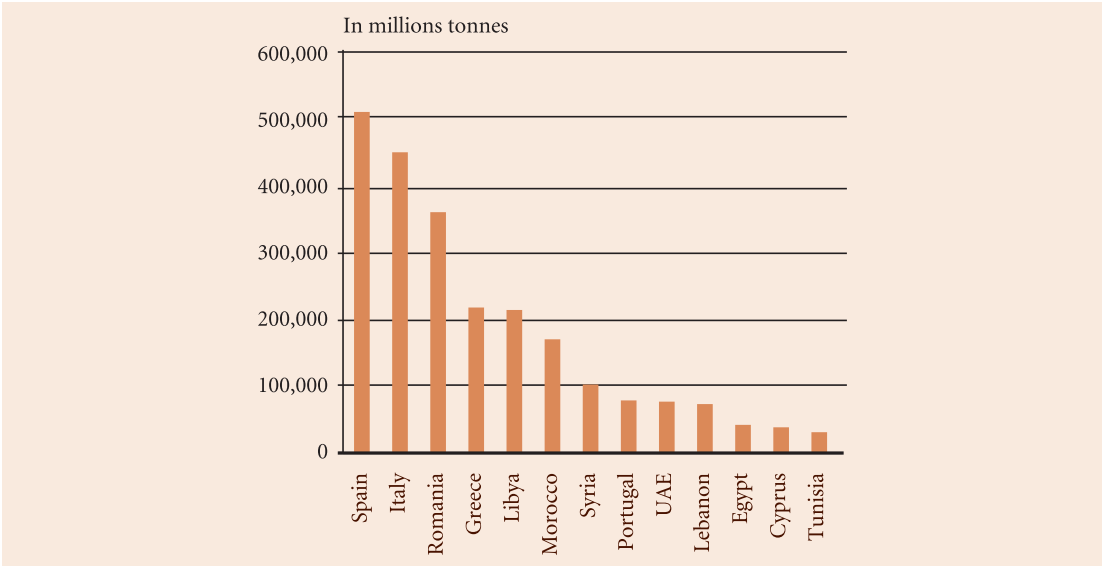
As a member country of the European Union in 2007, Romania receives the direct aid of the Common Agricultural Policy (CAP), which constitutes a powerful lever for the development of its agriculture. Foreign (mainly European) investment in land, which now covers around 700,000 hectares (i.e. 6.5% of arable land) is also stimulating agricultural productivity. However, the structure of most farms, and the poor quality of logistical and transport infrastructure, continue to hamper the growth of agricultural production. Although the country stands at a crossroads on the roadmap, the domestic network is still very uncertain, in particular, the secondary roads that connect the rural areas do not facilitate the conveying of agricultural products.

Modernisation efforts must also be made in the sea and waterway sectors. Romania has an interesting network of waterways and a large coastline dotted with many ports. Sea freight passes through three ports of the Black Sea (Constanta, Midia and Mangalia) and four other ports (Braila, Galati, Tulcea and Sulina) provide transport via inland waterways equipped with twenty-six river ports. If more than half of the

port and river infrastructure must be rebuilt or modernised, some are already an asset to trade. This is particularly the case for the new canal linking the new port of Constanta-South to the Danube, which shortens the traditional waterway to the Black Sea by almost 400 kilometres. As a gateway to the European market from the southeast, this port is located at the intersection of several European trade routes (East-West, Europe-North Africa, Middle East-Asia). Located about 300 kilometres from the Bosporus, this port can accommodate ships of large capacity (165,000 tonnes deadweight) and process 85 million tonnes of goods per year.

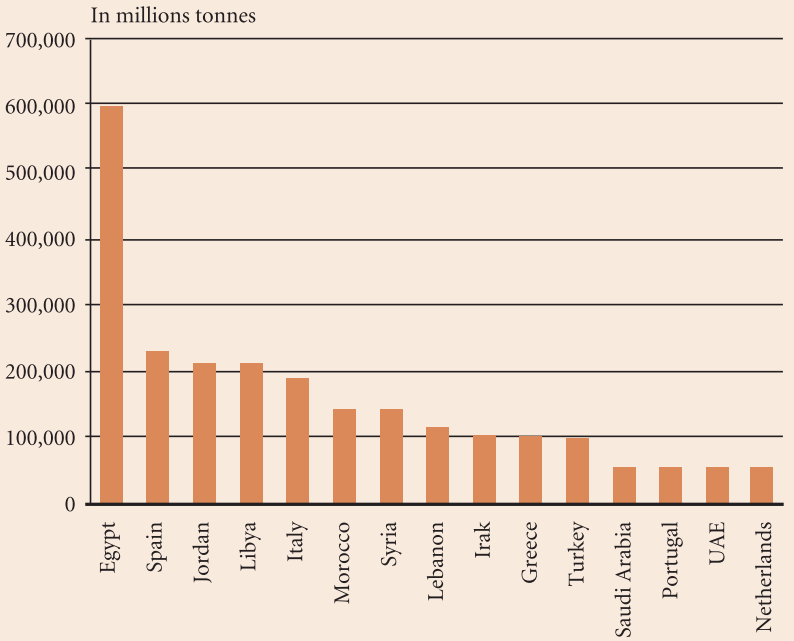
The modernisation of the Romanian ports is also of interest to the neighbouring countries. Russia, which no longer has its ports in Ukraine, is consolidating its position in Romania by investing in the construction of new terminals in the port of Constanta. The economic cooperation established with Ukraine, Moldova and Georgia also enhances the development of the Romanian transit network. Ultimately, these initiatives can promote the presence of Romania on international markets, starting with the Mediterranean region, which, in recent years has become accessible for Romanian cereals and oilseeds. Romanian grain is mainly exported to Spain, the European Union's largest importer of fodder cereals. The growing interest of international traders also helped Romania to win Egyptian call for tenders in July and August 2013. Despite this progress, Romania's export potential remains relatively modest. It is therefore unlikely that the country becomes a strategic rival to Russia and Ukraine on the Egyptian market, even though its presence can help to moderate the rise Russian and Ukrainian prices.

Figure 5 - Bulgarian wheat exports (in tonnes)



Source: FranceAgriMer and International Grains Council.

Figure 6 - Romanian wheat exports (in tonnes)



Source: FranceAgriMer and International Grains Union.

Table 2 - Wheat purchases by the General Authority (GASC), Egypt (in tonnes)

Origins	Marketing Year 2013-2014 (until 20 October 2013)	Marketing Year 2012-2013
Romania	780,000	120,000
Ukraine	705,000	115,000
Russia	480,000	540,000
France	0	0
Argentina	0	0
Kazakhstan	0	0
Canada	0	0
Australia	0	0
United States	0	0
Total	1,965,000	775,000

Source: FranceAgriMer and International Grains Union.

Bulgaria: an important country

Located in the eastern part of the Balkan Peninsula, bordered by Romania to the north, by Greece and Turkey to the south, by Serbia and Macedonia to the west and by the Black Sea to the east, Bulgaria has a favourable geographic position for trade. Its rich agricultural lands allow it to export cereals, oilseeds and tobacco. Cereals (wheat, corn, barley, rye and oats) and oilseeds (sunflower, rapeseed and canola) dominate its agriculture, accounting for 50% of its arable land.

On a political level, the accession to the European Union in 2007 has enabled the country to develop its agriculture and strengthen its agricultural trade surplus with its main European partners, i.e. Greece and Romania, as well as with Turkey, Albania and Croatia, given their geographical proximity. According to the statistics of the French Ministry of Agriculture, the main importers of Bulgarian agricultural products include Romania (30%), Greece (17%), Spain (9%), Germany (8%), Belgium (7%), Italy (6%) and France (6%). These countries are also its major suppliers: Greece (18%), Romania (17%), Germany (12%), Netherlands (10%), Poland (7%), France (6%) and Hungary (6%). This correlation is explained by the long-standing trade with these countries (bilateral agreements on agriculture and twinning), which played a significant role in Bulgaria's accession to the European Union.

In terms of transport infrastructure, Bulgaria is crossed by numerous international routes that are a real strategic corridor. Its rail network and the Belgrade-Sofia-Plovdiv-Edirne-Istanbul motorway allow Bulgaria to articulate the European transport network towards the Middle East and central and western Asia. Thanks to the Black Sea and the Danube, Bulgaria plays a major role in trade by sea and inland waterways. Varna, Bulgaria's largest multi-functional port, offers modern facilities and excellent transport connections, ferry and rail services. Its transhipment capacity exceeds 8 million tonnes of freight per year.

Conclusion

In recent years, the Black Sea countries have become important in economic and geopolitical terms. In this context of increasing power, agriculture is a clear advantage for these countries with strong agronomic potential. Amongst them, however, only Ukraine and Russia seem to be playing a role in strengthening ties with the Mediterranean. Almost a century ago, the British geographer Mackinder described them as the *Heartland* of the world: "Who rules East Europe commands the Heartland: Who rules the Heartland commands the World-Island [Eurasia]: who rules the World-Island commands the World". This region was already endowed with vast agricultural land and an extensive rail network. After decades of stagnation, or even escheat, the time has come for the productive and infrastructural start in these countries that wish to operate their "green belt" in order to extend their economic and geopolitical influence to deficit areas, particularly to the Mediterranean region, which currently imports almost 42 million tonnes of wheat per year.

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CHAPTER 5

MEDITERRANEAN AGRICULTURAL AND AGRO-FOOD TRADE: CAUGHT BETWEEN AMERICAN GIANTS AND EMERGING ASIAN COUNTRIES

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Whether you breakfast in Algiers, Beirut or Florence, you will be probably drinking your Brazilian coffee or Chinese tea with a slice of bread made from cereals coming from Canada, America or the plains of Ukraine, with a chocolate spread containing Indonesian palm oil and juice made from Brazilian or Californian oranges. This strongly growing trade penetration of agricultural and agro-food products coming from emerging countries or the leading American agricultural powers is no mere fantasy. It is a reality leading to an upset of food balance and trade flows in the Mediterranean.

The growing presence of these products in the Mediterranean reflects not only the sourcing practices of major distribution companies, the strategies of agro-food multinationals and the will of Southern and Eastern Mediterranean Countries (SEMCs) to diversify their agricultural suppliers, but also the commercial activism of the emerging agricultural countries (Brazil, China, India, Indonesia, Ukraine, etc.) and the repositioning of North-American agricultural powers. This particularly leads to an increase in trade flows, a reconfiguration of logistics chains and major changes on consumption modes with significant consequences in terms of food and nutritional security. Thus, while undernourishment (calorific deficit) is still fairly low in the Mediterranean, all the other indicators (economic, environmental, health and social) are set to red and allow to speak of serious food and nutritional insecurity brought by an agro-industrial food system, which is in crisis today (Rastoin and Ghersi, 2010).

In this chapter, we will study one aspect of food insecurity i.e. the dependence of local populations on foreign sources of supply. Firstly, we will analyse the change in the origin of imports of agricultural and food products by Mediterranean countries marked by "the temptation of broader perspectives", i.e. the erosion of the traditional suppliers' market share, especially from Europe, to the benefit of American and Asian new entrants. In the context of the market globalisation, trade flows are mainly driven by major agro-food and trading firms whose profiles and strategies will be presented. Lastly, based on market dynamics and the behaviour of actors, the prospects for a redeployment of the Mediterranean countries' food supply sources and their potential impact in terms of regional food security will be outlined.

Flows and actors: from the Far West to the Far East

The Mediterranean region includes twenty-three countries according to the classic definition based on the coastline[1] criterion. These countries spent 286 billion dollars for their agricultural and food needs in 2011[2], or 16% of world imports for 7% of the population. These massive purchases were accompanied by weak exports in the sector and thus a very considerable deficit: 58 billion dollars in 2011. The rapid rise in imports (doubled between 2003 and 2011) and the trade balance (multiplied by 2.4) clearly shows the region's low export activity and the destabilising influence of international prices. These prices are highly volatile, but the overall trend is upwards due to the imbalance between supply and demand, itself exacerbated by the pressures of non-food biomass production (agrochemicals), financial speculation in commodities markets and weak government and intergovernmental regulation.

Trade is not the only factor that contributes to achieving food security. Capital flows invested in the food system (agro-inputs, agriculture, agro-food industries, trade and logistics) help to modulate trade through import substitution, exports and local or international purchases of inputs. A recent study conducted by the OECD shows that some 40% of world exports are generated by imported inputs[3]. Moreover, the share of added value resulting from imported factors of production in agricultural and agro-food exports amounts to about 20% for medium or high-income countries.

A highly importing region

The Mediterranean region is extremely heterogeneous and with multiple fault lines including the economic one. Thus, in 2011, the Mediterranean Balkan countries accounted for 4% of the region's population and for 2% of the zone's total agricultural and food imports. These ratios are of 57% and 25% respectively for the SEMCs

1 - Northern shore: Cyprus, France, Greece, Italy, Malta, Portugal, Slovenia and Spain (eight countries, members of the European Union, EU-Med); eastern shore: Albania, Bosnia-Herzegovina, Croatia and Montenegro (four Balkan countries); southeastern shore: Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, Syria, Tunisia and Turkey (eleven Southern and Eastern Mediterranean countries, SEMC). As Palestine was not included in the international statistics used, the figures include only twenty-two countries in all, and ten SEMCs. Strictly speaking, the Mediterranean coastline criterion does not apply to Jordan and Portugal, but these countries are usually included for historical and natural reasons.

2 - WTO statistics database consulted (http://stat.wto.org/Home/WSDBHome.aspx?Language=E).

3 - OECD, *OECD/WTO Database on Value-Added. Trade policy implications of global value chains*, Paris, 2013.

and of 39% and 73% for the EU-Med, clearly reflecting the growing gaps between income and consumption. The same disparities can be seen between countries within each Mediterranean sub region. In 2011, Slovenia spent almost 2,000 dollars per capita on agricultural and food imports (multiplied by 3.2 between 2003 and 2011), France 1,100 (x 1.7), Croatia 600 (x 2), Morocco 200 (x 2) and Libya 135 (stable), or a gap of 1 to 20, whereas the world average is 250 dollars per capita (x 2.2)

Here is a final observation related to the characteristics of international demand: In 2011, twenty-one of the twenty-three Mediterranean countries were in deficit, with amounts ranging from 21 billion (Italy) to 10 billion dollars (Egypt and Algeria), 1 to 5 billion for twelve countries and 500 million to 1 billion for five countries. Only two countries were in surplus: Spain (4 billion) and France (14 billion). In other words, the twenty-one deficit countries accumulate a total foreign food bill of 76 billion dollars. The bill has more than doubled in eight years. This situation should draw the attention of political leaders in a context of growing debt in almost all the countries of the region.

In this context, governments obviously seek to buy essential foodstuffs as cheaply as possible and this brings international competition into play. At the same time, it allows them to diversify their sources of supply and free themselves from the risk of dependence on certain, often traditional, suppliers (Petit *et al.*, 2006). This strategy is facilitated in the SEMCs by state centralisation of product purchasing through public tendering (especially in the case of cereals).

Trade flows and regional integration: the decline of Europe

To analyse the recent pattern of trade flows between Mediterranean countries and their foreign suppliers, we have established a macro-regional matrix based on the United Nations Comtrade database for the years 2000 and 2010. The available data for 2010 allows us to analyse the above-mentioned twenty-two Mediterranean countries grouped into four zones. We then took the top thirty world countries that export to the Mediterranean region, which alone account for almost 80% of exporters supplying this region, or 136 billion dollars out of 172[4]. Table 1 shows the great trade imbalance within the region.

We note that the "rest of the world" (excluding these top thirty exporters) weighs much more for the Mediterranean Balkans than for the SEM and EU-Med countries. Throughout the region, there is still a preference for proximity, since Western Europe, essentially the European Union (EU)[5] remains by far the first agricultural and food supplier. This situation can be explained by the weight of the EU in the area and the intensity of trade on the large European Single Market (intra-zone trade).

4 - The amount of world imports by the above-mentioned Mediterranean countries (286 billion dollars in 2011, 240 billion in 2010) is significantly higher due to different nomenclatures and sources.

5 - With three equal proportions of exports of around 16 billion dollars to the Mediterranean countries: France, closely followed by Germany and Spain.

The EU provides almost one quarter of the SEMCs food needs. This may be due to historical and geopolitical reasons, as the Euro-Mediterranean Free Trade Area, the cornerstone of the Barcelona Process (1995), does not yet include agricultural and agro-food products.

Table 1 - Imports of agricultural and food products by Mediterranean countries in 2010, by area of origin (in millions of dollars)

Importers / Origin of imports	Balkans	SEMC	EU-Med	Total Med
World	4,412	36,626	130,821	171,858
World share	3%	21%	76%	100%
Western Europe	1,518	9,583	85,194	96,295
Americas	388	9,917	10,650	20,956
Asia/Oceania	217	5,693	8,475	14,385
Eastern Europe	67	3,193	1,144	4,404
Subtotal top 30	2,191	28,385	105,464	136,040
Top 30/world	50%	78%	81%	79%
Other countries	2,220	8,240	25,357	35,817

Source: Calculations by the authors based on http://comtrade.un.org/db/, BEC, 28 March 2013.

However, this European position has been constantly eroding for the last ten years, as shown in Table 2. While the Mediterranean countries' agricultural and agro-food imports increased, in current dollars, × 2.4 between 2000 and 2010, Western Europe's imports only increased × 2.2, while Eastern European (Russia and Ukraine) imports grew × 5, those of the Pacific zone (Asian and Oceanian countries) times three and the Americas × 2.5.

Consequently, the market share changed significantly: 8.4 per cent less for the EU, taken over by Asia/Oceania (+2.4), the rest of the world (+2.1), Eastern Europe (+1.6) and the Americas (+1.5). There is thus a clear diversification of the Mediterranean countries' suppliers and an increase in their number. This is to the detriment of the EU and mainly to the benefit of the East.

Table 2 - The erosion of the EU and the rise of new entrants in Mediterranean agricultural and agro-food markets, 2000-2010 evolution (the multiplying factor of amount of imports and market shares)

Importers / Origin	Balkans	SEMC	EU-Med.	Total Med.	Market share 2000	Market share 2010	Difference (per cent)
World	3.2	3	2.3	2.4	100%	100%	
Western Europe	3.3	2.1	2.2	2.2	64.4%	56%	– 8.4%
Americas	4.1	3.0	2.2	2.5	10.7%	12.2%	1.5%
Asia/Oceania	5.2	3.7	2.8	3.1	6%	8.4%	2.4%
Eastern Europe	37.4	6.0	3.7	4.9	0.9%	2.6%	1.6%
Subtotal top 30	3.7	2.7	2.2	2.3	82%	79.2%	– 2.9%
Other countries	2.8	4.0	2.5	2.7	18.8%	20.8%	2.1%

Source: Calculations by the authors based on http://comtrade.un.org/db/, BEC, 28 March 2013.

The emergence of new trading powers

This chapter focuses on two specific zones: the Americas and the Pacific, including Asia and Oceania.

In just a few years, *Brazil* has become the leading American supplier to the Mediterranean countries, supplanting the United States and with over 7 billion dollars it is at the same level as Argentina, Canada, Chile and Mexico all together (Abis, 2011). No wonder it is called "the world's farm" (Abis and Nardone, 2009). Brazil has enjoyed the strongest growth in ten years. Its exports to the twenty-two Mediterranean countries have increased four-fold while its exports to SEMC have increased ten-fold i.e. twice the global average. Brazil's main customers are Spain (2.5% of Brazil's total agricultural and agro-food exports) followed by Egypt, France and Italy (over one billion dollars and about 1%).

The products concerned are sugar, meat (especially poultry), oil seeds (soya), animal fodder (soya meals) and coffee (see Table 3). This success can be explained by a particularly dynamic entrepreneurial class supported by extensive diplomacy advocating intense South-South relations and a fully integrated Arab diaspora in the country and well established in business.

Table 3 - Brazilian exports to the Mediterranean countries

Products	2010 (Millions of dollars)		% Med.	Variation 2010/2000 (x)	
	World	Mediterranean countries		World	Mediterranean countries
Total food products	57,917	9,094	16%	4.9	4.3
Sugar	13,006	2,386	18%	10.0	16.5
Meat	13,322	1,637	12%	6.9	6.2
Oleaginous plants	11,096	1,419	13%	5.1	3.2
Animal fodder	5,039	1,318	26%	2.9	2.2
Coffee	6,374	1,282	20%	3.1	2.6
Other products	9,080	1,051	12%	–	–

Source: Calculations by the authors based on http://comtrade.un.org/db/dqBasicQueryResults, SITC rev. 2, 29 March 2013.

The United States has strong political and economic interests in the region and it has successfully established cereal and soya agribusiness in most of the countries. If they have shaken the European bastion, they are in turn threatened by Brazil, their southern counterpart whose agricultural and agro-food exports have overtaken theirs, with six products over one billion dollars against only three for the United States. Cereals remain the United States' strongpoint.

One can also see a strong component of fruit and vegetables, which are the only American agricultural products that rise faster in the Mediterranean than in the world as a whole. There is a head-on competition with Brazil regarding soya seeds or meals. The twenty-two Mediterranean countries account for 8% of the United States' total agricultural exports, its main customers being Egypt (some 2%), Turkey and Spain (each with over 1%), Morocco, Israel, Italy and France (around 0.6% each).

Table 4 - United States exports to the Mediterranean countries

Products	2010 (Millions of dollars)		% Med.	Variation 2010/2000 (x)	
	World	Mediterranean countries		World	Mediterranean countries
Total food products	106,726	8,539	8%	2.2	2
Cereals and by-products	23,505	2,747	12%	2.1	1.4
Oleaginous plants	19,752	1,701	9%	3.4	2.8
Fruit and vegetables	17,680	1,330	8%	2.2	3.3
Animal fodder	9,308	799	9%	2.3	1.6
Other products	36,482	1,962	5%	–	–

Source: Calculations by the authors using the Comtrade database (2013).

With invoiced amounts ranging in total from 7.4 billion dollars down to 600 million[6], Argentina (2%), Canada (1%), Chile (0.5%) and Mexico (0.3%) are the other major suppliers to the Mediterranean countries, behind Brazil (4.3% of these countries' imports in 2010) and the United States (4%).

The Asia/Oceania zone consists of nine countries that form a huge demographic mass (China, India, Indonesia, Malaysia, Vietnam and Thailand) and on its western borders there is Turkey and, in the South, Australia and New Zealand. Mediterranean imports from these countries are still low in terms of market share: China (1.5%), Indonesia (1.2%), Turkey (1.1%), India (1.1%), Thailand (0.9%), Vietnam (0.8%), Malaysia (0.7%), New Zealand (0.6%) and Australia (0.5%) for amounts ranging from 2.6 billion dollars to some 900 million. However, they have been rising significantly for the last ten years by a factor of 3 to over 5 for the Asian countries, less for New Zealand and Australia.

Better known as the "factory of the world", China is also an important agro-exporter (6th position in the world behind Brazil). It generates a turnover of over 2.5 billion dollars in the Mediterranean countries and it is growing rapidly (× 3.2 in the last ten years). Fruit and vegetables and seafood are the two main exported products. The exports of seafood show a much higher increase than the Chinese global average. Meat and oils follow the same lines but the amounts are still modest.

Table 5 - Chinese exports to the Mediterranean countries

Products	2010 (Millions of dollars)		% Med.	Variation 2010/2000 (x)	
	World	Mediterranean countries		World	Mediterranean countries
Total food products	42,203	2,596	6%	3.3	4.2
Fruit and vegetables	16,115	1,021	6%	4.8	4.6
Fish	13,209	879	7%	3.6	5.7
Coffee	1,903	281	15%	3.5	2.6
Oleaginous plants	707	126	18%	1.7	2.4
Other products	10,269	288	3%	–	–

Source: Calculations by the authors using the Comtrade database (2013).

Indonesia is the second Asian country present in the region. It is a low-profile country but achieves a score that is close to China in magnitude (2 billion dollars

6 - The differences between export and import values stem from different nomenclatures and criteria used in the estimates.

of exports of agricultural and agro-food products, an eight-fold increase between 2000 and 2010) and much higher than the Indonesian global average (4.7 times higher in ten years). Ranked 19th agro-exporter in 2000, this country reached the 9th position in the world in 2010 with an agro-industrial model based on oil palm plantations.

Indeed, palm oil accounts for 80% of Mediterranean purchases from Indonesia. This Indonesian supremacy (the leading world exporter) in the international vegetable oil market – global palm oil exports are three times higher than soya, the second-ranked edible oil – stems from particularly attractive prices and strong delivery capacity. Palm oil is primarily an intermediate product in the manufacture of a variety of food commodities including biscuits and pastries particularly valued in Mediterranean countries, to the detriment of the local ingredient, olive oil. Coffee is the second product imported from Indonesia in the region, followed by fish, in small quantities.

Table 6 - Indonesian exports to the Mediterranean countries

Products	2010 (Millions of dollars)		% Med.	Variation 2010/2000 (x)	
	World	Mediterranean countries		World	Mediterranean countries
Total food products	24,912	2,039	8%	4.7	7.6
Oils and fats	16,608	1,624	10%	9.4	10.7
Coffee	3,240	206	6%	2.9	3.4
Fish	2,559	98	4%	1.6	2.4
Other products	2,505	111	–	–	–

Source: Calculations by the authors using the Comtrade database (2013).

Turkey occupies the third place among Asian agro-exporters to the Mediterranean countries (1.9 billion, multiplied by 2.6). India is close behind (1.8 billion, multiplied by 3.2). They are followed by Thailand, Vietnam and Malaysia with around 1.3 billion dollars. It is important to note that the exports from Vietnam have multiplied by 5.4 times. With over one billion, New Zealand's exports have been rising moderately (× 2.3), while with less than 800 million, Australian exports seem to have reached their limit (× 1.6).

Unlike what can be observed in Turkey, Brazil, the United States and above all the EU, in these countries there is no global strategic vision for the Mediterranean zone, or it is little translated into tactical terms. There is no coordinated approach to consumer countries and between sectors. However, the region's political instability could encourage Turkey to play a major political role in the Mediterranean thanks

to its mode of governance and its economic achievements. Its know-how in agro-food technology is of interest to local industrialists and this attractiveness is reinforced by a strong dynamism in upstream agriculture (agricultural inputs and agricultural equipment), especially through major structural projects (Huber, 2013). Lastly, all the Pacific zone countries (except those of Oceania) will have to supply an immense domestic market as a matter of priority, which sooner or later will restrict their exports. Consequently, the Far (South) West thus seems to have better long-term prospects than the Far East.

Business strategies and the dynamics of trade in the Mediterranean

Foreign Direct Investment (FDI) helps multinational firms to establish their activities and increase international trade through intra-subsidiary flows. FDI is strongly correlated with economic growth and export intensity. Indeed, businesses mainly aim at capturing new national and regional markets through FDI.

In 2010, the Mediterranean region benefited from a higher level of FDI than the world average (266 dollars per capita against 195)[7]. However, FDI inflows are very uneven from country to country and their evolution is quite different: four times higher in the EU countries than in the SEMCs, they tripled in the SEMCs between 2000 and 2010,and fell by 10% in the northern Mediterranean countries.

For a long time, the SEMCs remained marginalised in terms of FDI (Abis, 2013; Cheriet *et al.*, 2012). In the early 1990s, they attracted only 1% of FDI inflows in the world, while their population was of about 4%. After the major flows that have affected the CEECs and then the Asian countries, especially China, since the early 2000s they have benefited from considerable movements, reaching over 51 billion dollars in 2007 (2.6% of global flows, 9% of flows to developing countries. These flows then relapsed (a three-year average of 38 billion centred in 2010) but retain the same global share while declining in the developing countries (5.7%) (UNCTAD, 2011).

In the SEMCs, energy, construction and civil engineering, banking and telecommunications are at the top of the list of recipient sectors of FDI in 2010 with an average of just a little less that 21 billion euros annually over the period 2008-2010, or 64% of FDI received by the SEMCs (33 billion euros). The agro-food complex (agro-food industries and major distribution) attracted a little more than 8% of all FDI (2.7 billion euros). In the Mediterranean, the FDI issue is related to the polarization of capital flows and the regional geopolitical challenges. However, if the issue is analyzed in terms of forms and nature of investments, it also reflects the strategic behaviour of firms in the region. The specific features of the food industry and the political and institutional basis of this investment in the Mediterranean will now be analyzed.

7 - This includes all the sectors. Sectoral figures by country are not available in international databases, except for the OECD countries.

The strategies of agro-food enterprises and businesses as a vector of product and capital flows

A brief overview of investment in all these sectors reveals the nature of flows and projects and the evolution of the profile of investors in the Mediterranean. Between 2003 and 2011, the eleven SEMCs recorded capital inflows of 305 billion euros coming from abroad. European firms remain the leading investors. European FDI accounted for 45% of inflows in 2011. However, they dropped sharply (– 7 billion when compared with 2010) and reached their lowest level since 2004.

Perhaps related to the crisis in the European Union, this pattern contrasts with the dynamism of the other two groups of investors. In 2011, the United States alone accounted for almost a quarter of FDI (23%), an increase of one billion over 2010, rising to 6 billion euros. For their part, the BRICS represent one fifth of investments at almost 5.6 billion euros in 2011. In terms of destination, 2011 saw little change. Turkey continues to concentrate a large part of its FDI in the Mediterranean (44%) followed by Israel and Egypt. It also marks a record level of FDI in the agro-food industry, which, for the first time since 2003, was ranked second in terms of flows, with some 3.8 billion euros (two acquisitions of brewery companies in Turkey largely account for this investment).

Table 7 - Ranking of countries investing in the Mediterranean (11 SEMCs), cumulative amounts 2003-2011 (millions of euros)

Country	Amount in 2003	Amount in 2011	Cumulative FDI 2003-2011	Country ranking/ cumulative amount of FDI
United States	1,583	5,284	49,468	1
United Kingdom	254	4,648	32,802	2
France	813	783	29,154	3
Spain	1,933	69	12,123	7
Italy	326	1,842	11,702	8
Canada	72	936	5,693	16
Saudi Arabia	288	1,235	14,240	5
United Arab Emirates	216	513	27,387	4
Kuwait	1,003	340	13,552	6
Qatar	NC	546	7,638	13
Russia	0	1,852	11,687	9
China	309	1,276	7,723	12
India	0	453	3,532	18
South Africa	NC	110	2,798	21
Brazil	0	NC	793	36

Source: Established by the authors from the FDI Mediterranean Observatory, 2012 (animaweb.org).

Considering the rankings of investors in the period 2003-2011 in all sectors, the first thing to note is the relative stability of the ranking of certain European countries. The second is the relatively significant share of the Gulf States, which make up the second group of investing countries, and lastly the emergence of BRICS as secondary actors, whose weight has strongly increased over the last decade.

However, this last observation needs to be considered in relation to the weight of these countries in terms of trade. There seems to be a disparity between the weight of trade and that of the effective presence through FDI, a disparity that is particularly marked in the agro-food industries. The growth in agricultural exports of BRICS is weakly embodied by a stronger presence of multinational agro-food companies in the Mediterranean.

The agro-food industries, a specific sector for FDI in the Mediterranean

The analysis of FDI in the agricultural sector and agro-food industry in the Mediterranean reveals a strong increase in the amounts invested, despite a relative stability in the number of projects concerned. Between 2003 and 2011, foreign firms invested a total of 11 billion dollars corresponding to almost 4% of total FDI in these sectors. Compared to other sectors, agriculture and the agro-food industry are of moderate importance. On average, they are ranked at the 7th position, far behind the energy, automobile, telecommunications or construction and civil engineering sectors.

Table 8 - FDI trends in the agro-food industry (AFI) in SEMCs between 2003 and 2011 (in millions of euros)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
AFI	354	288	249	2,349	1,052	1,687	1,206	264	3,892	11,340
Total FDI	9,271	11,283	36,871	64,470	53,278	36,942	27,441	38,519	26,516	304,591
% AFI/total	3.7	2.6	0.7	3.6	2	4.6	4.4	0.7	14.7	3.7
Rank AFI/ 25 Sectors	8	10	13	10	9	8	5	15	2	7

Source: Calculations by the authors based on Anima-Mipo Observatory data, 2012.

Apart from 2011, a year during which a few major partial or full acquisitions of brewery firms in Turkey occurred, the sectors concerned recorded an annual average of 35 FDI projects. In terms of destination of FDI, it is important to state that Turkey takes a major share both in terms of number of projects (88 projects between 2003 and 2011) and amounts invested. With 72 projects announced in Morocco, 44 in Egypt, 33 in Tunisia and 29 in Algeria, the southern Mediterranean countries are a priority for agricultural and agro-food FDI projects (Anima-Mipo Observatory, 2012).

The analysis of this direct investment in the sector over the period 2007-2011, focusing on non-European firms, challenges the idea of a mass influx of firms from

BRICS into SEMCs. Apart from about a dozen operations, the majority of operations are made by European firms and, to a lesser extent, firms from the Gulf countries. Lastly, some operations concerned South-South FDI (Egyptian, Turkish or Tunisian firms investing in Israel, Libya or Jordan).

Agro-food FDI by the Gulf States in the Mediterranean has two distinct motives. The first is related to industrial objectives i.e. the expansion of existing subsidiaries, the acquisition of local companies or joint ventures. With its investments in Turkey in 2007 (acquisition of Yudum Foods) and in Algeria in 2008 (investment in plants with production capacity of a million tonnes of vegetable oil), the Saudi Savola/Afia Company is a good example. The Kuwait Food Co's investments in the cereals sector in Egypt or that of a United Arab Emirates company in 2009 in a factory producing tomato concentrate for export to Europe and Africa reflect the industrial rationale behind this type of FDI without masking an investment strategy to strengthen their presence in these countries. Thus, the Saudi Ajwa Group invested 160 million dollars to take the control of its Egyptian subsidiary in 2010.

Besides these "industrial" investments, FDI from the Gulf States is also related to the rationale of upstream control of the chains and is characterised by the growing weight of institutional and private investment to control agricultural production through the acquisition or land grabbing. Numerous projects of this type have been recorded. They have been led by the Emirates Tiris Euro Arab Fund in Morocco in 2009, involving 700,000 hectares, the Jenaan Fund in Egypt to farm 42,000 hectares of cereals, the EIIC Mahassil Fund which invested 132 million dollars to build the biggest dairy farm in Africa together with a fodder production project in Algeria, or Saudi Arabia with the announcement of a spectacular project of 2.2 billion dollars in 2009 by the Planet Food World Fund to create 20,000 industrial farms covering an area of 200,000 hectares in Turkey during the period 2010-2014.

The objectives of FDI from the United States are different: American firms have been relatively active during the period covered by this study through the expansion of subsidiaries (e.g. Kraft Food in Morocco in 2007, Coca Cola in Turkey in 2008 or Pepsi Co in Egypt in 2009). Some transactions involved acquisitions or consolidation of presence, notably Heinz in Egypt which overtook the shares of the Kuwaiti American Group in the Egyptian company Cairo Food Industries, Pepsi Co's acquisition of the Egyptian company Beyti for 82.6 million dollars in 2009 and in the same year, the purchase by Pepsi Co of the shareholding of its Saudi partner, Al Marai, in the Jordanian dairy products company, Taiba.

In addition, some projects of American firms involved building marketing capacity in local markets (e.g. the opening of a commercial agency by Cargill in Algeria in 2010) or franchising (Smoothie King franchise for the local Amer Group in Egypt in 2009). Lastly, in a few cases, American firms' FDI was aimed at implantation through share acquisitions (e.g. Morning Star which bought 10% of Tat Konserve's shareholding, in Turkey, in the capital of Harranova Besi in 2008) or the launch of large projects targeted by investment funds like in the case of LCC International Investment Group which invested some 30 million dollars in animal feed production plants.

Finally, there are a few projects of firms from emerging countries and other countries outside Europe, the United States and the Gulf States. These are primarily projects of the Indian IFCO Group which bought the Appétissante biscuit factory in Tunisia in 2007 and which signed a partnership agreement with the local Turkish company JPMC for the construction of two agricultural fertiliser manufacturing plants (240 million dollars) in 2009.

For its part, the Indian Rasna Company announced the opening of a sparkling drinks production unit under its brand in Egypt in 2008. Lastly, an agreement was signed between the Egyptian consortium Orascom Construction Industries and the Brazilian company Fitco for the distribution of agricultural fertilisers in Brazil. Other investments involved firms from other countries (Alliance Grain, a Canadian company which bought the Turkish Arbel company in 2009 or the New Zealand multinational, Fonterra, which opened a milk processing plant in Morocco in 2008).

What does the presence of the emerging countries in the Mediterranean reveal?

The development of agricultural and agro-food exports from the emerging countries to the Mediterranean, contrasts with these firms' modes of presence. This situation is not only a matter of delay in establishing themselves but it reflects different strategies. Emerging countries are consolidating their industrial presence in the north and their commercial objectives in the south and east Mediterranean. They thus replicate the strategies of Europe and America.

Forms of firm establishment and strategies

Beyond the factual aspects which emerge from this initial analysis of investment in the agricultural and agro-food sectors in the south and east Mediterranean, several observations enable to put the weight of multinational firms from the emerging countries in investment inflows to the region into perspective. There is a gap between their FDI flows and their growing role as suppliers of raw or semi-processed agricultural products. Unlike the slower growth in exports from the United States, Canada or the EU, the major differences in the growth of agricultural and agro-food exports from emerging countries often increased three or four-fold, even five or six-fold (as in the case of Brazil in the last decade) reveal the disparity in these countries' commercial weight. The EU and the United States are still by far the leading agricultural suppliers to SEMCs (some 9 billion dollars against 4 billion for the four emerging countries). The situation is even more marked for agro-food products, where EU exports amount to some 27 billion against barely 3 billion dollars for the four emerging countries.

Secondly, the analysis of FDI flows in the agricultural and agro-food sectors also reveals that multilateral firms from emerging countries adopt different strategies for their establishment in the north and their presence in the south and east Mediterranean. Some authors highlight the activism of Brazilian funds in European Mediterranean countries (the JBS acquisition of shares in the Rigamonti Salumificio company in Italy in 2001, for example), while in SEMCs these companies continue

to establish partnerships or contractual commercial relationships with public organisations or private partners to develop the presence of their products (Févre and Pouch, 2013). In some cases, the emerging countries rely on the establishment of firms in northern Mediterranean countries (or in Turkey) to provide logistical coordination for their flows to SEMCs and the Middle East and Gulf States. This is especially true for exports of raw and refined sugar, beef and poultry by Brazilian and Argentinean firms.

This disparity between a low "capitalist" presence of food companies from the emerging countries and the increased intensity of trade links is a key aspect of relations between SEMCs and the emerging countries. Russia is Morocco's second biggest citrus fruit customer (Abis, 2012). Arab countries are as important as China in terms of export flows for Brazilian agricultural products. Brazil supplies almost all the sugar imported by Algeria and Egypt, 91% of beef imported by Egypt and half of that imported by Algeria.

Table 9 - Export trends in agricultural and agro-food products to 6 SEMCs (in millions of dollars)

Countries exporting to 6 SEMCs*	Exports of agricultural products			Exports of agro-food products		
	2001	2010	Change	2001	2010	Change
Argentina	537.6	1,990	370	277.7	859.8	310
Brazil	232.6	1,312.9	564	313.6	2,118.4	676
China	119.9	368.6	307	28.8	137.6	478
India	127.6	670	525	20.3	64.3	317
United States	1,526	3,462	227	313.4	479.4	153
Canada	490.5	650.9	133	21.4	8.3	39
EU	2,803.5	5,724	204	10,486	27,234	260

* Algeria, Egypt, Morocco, Jordan, Syria, Tunisia.
Source: Calculations of the authors based on Comtrade data (2012).

Irrespective of the huge presence of firms, the strengthening of the emerging countries' positions stems primarily from a "geo-economic" logic. Moreover, this commercial penetration of the great emerging powers into the Mediterranean has been broadly analysed by a number of authors (Abis, 2011 and 2012; Brun, 2011; Saint-Mézard, 2013). A consensus seems to be established around the effectiveness of certain countries' global diplomatic and political approach (notably Brazil under Lula's presidency) to the spectacular growth of the trade of India, China and Brazil since the mid-2000s (Brun, 2010; Vairon 2010).

However, this observation of the acceleration of agricultural and agro-food products export flows from the emerging countries needs to be apprehended in three ways. Firstly, it is important to emphasize the fact that Brazil's main partners in North

Africa and the Middle East are Saudi Arabia and the United Arab Emirates and not the southern Mediterranean countries. Secondly, it is important to note that a large part of import flows, especially of the so-called strategic products (cereals and milk) come from the EU countries, the United States and Canada, even though, for some years, imports of wheat from Russia and Ukraine have been increasing.

Moreover, these trade flows are more dependent on political relations between the countries than the action of firms or trading partners alone. Thus, some powers rely on "pivotal" countries in their trade strategies, with a particular emphasis on the country and industrial sector (e.g. China with Israel for arms, India and Egypt for infrastructure, or Russia with Turkey for expansion of trade and energy). This affiliation between trade and geopolitics reinforce the idea of a "non-neutral" commercial presence of the emerging countries in the Mediterranean.

The third observation resulting from a review of FDI operations in the agro-food sector concerns the strategic analysis of firms in the region. It is clear that, depending on the architecture of the agricultural and agro-food industries, very different investor profiles can be distinguished. While Gulf companies are mostly governed by a rationale of diversification of financial investments, notably through investment funds, European and American firms seem more attached to industrial arguments essentially targeting the markets of the host countries or the creation of a platform for neighbouring macro-markets (Africa and Europe).

Unlike their presence in northern Mediterranean countries, agricultural and agro-food firms from the emerging countries are relatively absent from SEMCs in terms of FDI. In SEMCs, their actions are limited to trade partnerships that are of course increasingly important with private operators but primarily in the framework of public programmes (e.g. imports of meat from India and Brazil by Algeria and Egypt). By limiting their presence to trade flows, without any base in industrial assets, firms from the emerging agricultural countries or major agricultural powers thus seem to take the opposite strategic approach to that of their North Mediterranean counterparts. Between these two points of the continuum "pure trade flows" *versus* "penetration through independent subsidiaries", a few projects of a logistical nature, reflect the role of some SEMC in transit trade.

The emerging countries in the Mediterranean: trade or economic powers?

How can the strategic differences between European firms and those from emerging countries in the agricultural and agro-food sectors be explained? What are the differences between firms from emerging countries that are present through agricultural export flows and other ways (subsidiaries, partnerships, etc.) for some particular sectors (civil engineering, energy and association with mega infrastructure projects)?

The comparison between agricultural trade flows and the modes of establishment of agro-food firms from the emerging countries attests the disparity between their strategies and those of American or European companies. The sectoral comparison also reveals differences between sectors where companies are strengthening their

presence (energy, telecommunications and automobiles) and the agricultural and agro-food sectors where they "content themselves" with ensuring trade flows and logistical supervision, sometimes through their European subsidiaries.

At the first stage of their development, the relations between the SEM and emerging countries should be strengthened by the actions of firms and inter-company partnerships. There is already a shift from inter-country connections (state contracts, imports via public departments or national calls for tenders) to "classic" commercial links i.e. exploitation of commercial opportunities, signature of supply contracts, granting of licenses, etc. In other words, firms from emerging countries are still at the stage of commercial presence, while American and European firms are now at the stage of consolidating their establishment. A good example is Danone, which is engaging in increasing local partnership agreements in all its businesses.

The flows *versus* strategies of firms in terms of modes of presence in Turkey are a perfect illustration of this. A strategic "pivot" for many emerging countries, Turkey alone attracts a large part of FDI flows in the agro-food industries, embodied by operations that consolidate the presence of European and American firms often involving major local partners (brewery industry, sparking drinks, confectionery, etc.) (Koç, 2012).

Some authors explain the preponderance of trade flows and the relatively weak capitalist presence in SEMCs by a diplomatic activism driven by economic growth, the geopolitical structure of certain countries (China, Russia and Brazil especially) and the historical "neutrality" of their actions compared to EU countries or the United States.

The Euro-Mediterranean: a potential actor in a multi-polar world?

Prospective analyses all show an aggravation of the structural food dependence of SEMCs (apart from Turkey), in particular for cereal products, sugar, meat and animal feed, while surpluses in the Euro-Mediterranean countries could increase (Hervieu, 2008). This commercial "symmetry" of structural imbalances could make sense in the framework of a regional arrangement or bilateral cooperation agreements between countries on the two shores. However, for the past years, hesitancy, inertia and frequent political divergences between the southern countries and between European countries block the way to an economically integrated regional entity.

In this context, the rise of agricultural and agro-food flows from the emerging countries is a challenge to the historical ties between the north in surplus and the SEMCs in deficit. This indisputable breakthrough by the emerging countries introduces new factors into future prospects. In the medium term, there are three possible scenarios.

1) The first corresponds to the current trend of an accentuation of agricultural exports from the emerging countries in the framework of the "new South-South cooperation". This trade will be limited to products in which certain countries are leaders (soya, sugar, beef and poultry) or products for which these countries are

becoming more important (wheat, maize). In this context, relations based on flows will characterise the links between Mediterranean and emerging countries (BRICS), notably through commercial opportunities between private and public operators in the countries concerned. These relations will depend extensively on prospection activities and the strengthening of bilateral ties. Agro-food export firms will content themselves with a minimum "commercial" presence, without significant industrial investment, relying initially on their subsidiaries in the south of Europe to manage the logistical requirements of shipping their products.

2) The second scenario would see the emerging countries' strategy pegged to the United States' vision for the Mediterranean, making the region an agricultural trade "artery". In the framework of what some authors have called, with respect to Brazil, the "food corridor"[8], there would be a move to intensify agricultural imports of SEMCs, with a policy of diversification of suppliers. Some emerging countries have thus embarked on cooperation in agronomic research in order to meet the specific food needs of the southern Mediterranean countries. Embrapa, a public research body in Brazil, is developing a research programme in collaboration with Tunisia on the adaptation of the cultivation of soft wheat to the northeastern region of Brazil (Brun, 2010). Besides increasing flows, multinational firms would also seek to establish logistical port hubs in certain southern countries (Morocco, Egypt, Turkey and, to a lesser extent, Algeria).

3) The third scenario challenges the first two. It involves an active role for the Mediterranean countries in building stronger regional cooperation, in particular in agriculture and the agro-food sector. Several factors argue in favour of this third future scenario: firstly, the existence of proven competitive advantages of the southern European countries in trade exchanges with SEMCs, based on geographical proximity, the intensity of economic and cultural ties, existing trade relations and the longstanding presence of European agro-food firms in the region.

However, these competitive advantages can no longer be taken for granted. Euro-Mediterranean cooperation must go beyond the current bilateral trade relations (Rastoin *et al.*, 2012). In this light, some emerging countries (Brazil in particular) could be "contained" by a more active EU presence in the region (Abis and Nardone, 2009). Among other things, this would take advantage of agricultural and food complementarities at large (from cultural to commercial) in the framework of co-established relations that meet the criteria of sustainable development.

Such Euro-Mediterranean cooperation would be a credible alternative to the first two scenarios, because they depend on two preconditions. On the one hand, the removal of the logistical constraints that are still significant in some countries (e.g. agricultural trade between Brazil and Algeria [Naili, 2012]) and the establishment of port terminals dedicated to agricultural products. On the other hand, a greater presence of agro-food firms from emerging countries, some of which are handicapped by their lack of critical mass when compared to European and American leaders.

8 - Term used by S. Abis and J. Nardone (2009) concerning a scenario of development of agricultural trade between Brazil and the Arab countries.

These logistical challenges are becoming intense due to the increased competition between the major global firms of the Triad countries (North America, Europe, Japan) and increasingly with those coming from emerging countries (Brazil, Indonesia, India, China and Argentina for ingredients, primary or semi-processed products) for the access to the European market. The SEMCs would then constitute a fulcrum for the construction of macro-regional platforms. Some countries (China essentially) have already shown their will to control the logistical infrastructure of SEM and southern European countries.

This third scenario is subject to the increasingly rapid change in cooperation and regional economic integration in the Euro-Mediterranean region, both South-South and North-South. These efforts should transcend short-term political considerations and specific economic divergences to build a joint Euro-Mediterranean project. It is in the framework of such a scenario that Europe and SEMCs can envisage mutually profitable relations and synergies. If this joint cooperation is not developed, the risks of the occurrence of scenarios 1 and/or 2, in other terms, "the temptation of broader prospects", meaning nationalistic approaches to food security and a dead-end in terms of efficiency and sustainability, will be huge as this is a fundamental issue calling for a global and systemic response. The future agricultural and food policy of the Euro-Mediterranean countries is thus at the heart of the regional geo-strategic challenges.

Conclusion

In 2011, the countries bordering the Mediterranean accounted for 16% of world imports of agricultural and agro-food products for 7% of the world population. Their imports doubled and their trade balance increased × 2.4 between 2003 and 2011. If we add the deterioration in the quality of their food with the disappearance of the traditional diet lauded by nutritionists, we can say that these countries are in a critical situation of food insecurity. From the point of view of supply, there is a high dependence on sources outside the Mediterranean countries, marked in recent years by major changes in the list and weight of the principal suppliers.

Of course, the EU is still, by far, the leading food provider to the Mediterranean countries. However, other zones contest this supremacy. The EU lost over 8% of its share in the agricultural and food market in the region between 2000 and 2010 (from 64% to 56%), while that of Asian countries and Oceania rose by 2.4% (to 8.4% in 2010), Eastern Europe by 1.6% (to 2.6%) and the Americas by 1.5% (to 12.2%). It is important to note the spectacular breakthrough of Brazil, which increased its exports to the twenty-two Mediterranean countries more than fourfold. China increased its share by 3.2. This new trade factor has not disturbed the pattern of foreign capital flows destined for the Mediterranean region. FDI in agriculture and the agro-food industry remains modest in SEMCs (an annual average of 1.3 billion euros over the period 2003-2011) and relatively high in the EU Mediterranean countries. There again, the EU is the leading investor, followed by the United States and the Gulf States. The strategies of agro-food firms are coloured by their nationality. While the historic giants (Nestlé, Danone, Coca Cola, etc.) are present through

industrial establishments in SEMCs, companies from the emerging countries (BRICS) mainly have commercial and logistics subsidiaries to facilitate their exports. However, investments in production will take place according to the theory of the internationalisation cycle of firms and the advent of world leaders in these countries (e.g. JBS in meat in Brazil).

The current changes in agricultural and agro-food trade and industries in the Mediterranean region clearly reveal the "temptation of broader perspectives" in terms of suppliers, the Mercosur countries to the West and to the East (primarily China, India, Thailand and Indonesia). They explain why the North (the EU) has a good reason to fear an inexorable decline in bilateral international agreements such as the one signed between Morocco and the United States in 2005. The failure of the WTO Doha Round, the stalling of the Euro-Mediterranean Free Trade Area launched by the Barcelona Process in 1995 and the economic and political problems experienced by the EU since the crisis in 2008 are likely to encourage this movement, even if this scenario is not inevitable.

Indeed, the "broader perspectives" bring about constraints in terms of logistics (remoteness), adaptation of products and processes to Mediterranean cultures, above all, in terms of geopolitics. In a multi-polar world dominated by two economic blocks, Asia and America, the arguments in favour of proximity could be more appropriate and fruitful politically. Euro-Mediterranean and tomorrow, Euro-African cooperation are quite promising due to the interregional complementarities around and beyond the Mediterranean (Hajd Nacer and Romero, 2013). Nevertheless, such a scenario obviously requires a radical change in terms of economic, scientific and technical cooperation, especially in the field of food and agriculture, in both its South-South and North-South dimensions.

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CHAPTER 6

TRANSPORT INFRASTRUCTURE AND LOGISTICS: THE STRATEGIC LEVERS OF TRADE AND COMPETITIVENESS

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The development of transport and the improvement of logistics performance are crucial issues for countries seeking to become more competitive on the international geo-economic scene. Good infrastructure helps to facilitate trade flows and is therefore an additional guarantee of success in international trade, while at the same time providing local solutions to improve access to certain marginalised regions and allow them to play their part in the national economy. Facilitating trade and transport is thus of growing importance for the Middle East and North African (MENA) countries, which not only need fast, reliable and frequent services to transport their exports and imports, but which must also comply with new and stricter safety requirements. For a country to become rooted in the dynamics of globalisation, a certain number of logistical skills are required in terms of time and space management alike – conditions which are all the more necessary for trade in agricultural products.

This chapter offers an overview of the existing infrastructure in the Maghreb, by addressing firstly the evolution of different modes of transport, and secondly the question of customs, regulatory and technological measures that are essential to food trade. It goes on to formulate some thoughts about how future integration of the Maghreb could be developed through a better synergy between public and private policies for the development of infrastructure, logistics and trade. The cases of Lebanon and of the current conflict in Syria also provide an opportunity to consider the difficulties that nations may encounter in their agro-economic development when neighbouring states are subject to heightened geopolitical tensions.

A brief overview of infrastructure and logistics performance

The importance of transport infrastructure in the growth of trade relations in the Maghreb countries is obvious. A simple increase of 10% in transport costs can reduce the volume of trade by 20% or give rise to cost inflation (Carruthers, 2012). Having efficient ports facilitates foreign trade and reduces shipping costs. Thus, for example, having storage facilities (silos, refrigerated warehouses, agro-food logistics platforms) and a good grasp of ship charter contracts and logistics chains would reduce shipping costs and help to control the import costs of cereals.

Ports and port systems/throughput

The Maghreb countries have a vast maritime façade, yet their trade network is largely based on European ports, although the port of Tanger-Med in Morocco is gradually capturing some of the Maghreb trade from Asian and Atlantic sources. This complex should eventually become a key port for Maghreb trade. However, because of poor management of port operations by port authorities, other Maghreb ports are still entrenched in a somewhat inefficient maritime logistics chain, and therefore lag behind Tanger-Med (Mohamed-Chérif and Ducruet, 2011).

Two categories of ports are at opposite ends of the spectrum. At one end, there are the first-generation ports (UNCTAD, 1992) that are very often trapped in urban enclaves, many of which were enlarged and redeveloped at the end of the nineteenth century. These ports have neither handling equipment (only conventional cranes are used), nor suitable infrastructure for container ships over a certain size (draft generally less than 10 metres). This means that only small ships can dock in these ports. Furthermore, the great majority still handle large quantities of conventional goods, i.e. not containerised. The specialisation of terminals has not yet been completed and the boundaries of designated areas for different types of traffic are still not clearly defined. All too often, traffic in terminals is still poorly organised, with no zones reserved for trailers or containers (e.g. Radès in Tunisia or Algiers).

At the other end of the spectrum are the third or fourth-generation ports, so-called global ports (logistics hubs or interconnection points for several sites). These ports, such as Tanger-Med in Morocco, have good-quality infrastructure (draft over 10 metres and up to 16 metres or more) which allows them to accept container carriers of over 6,000 twenty-foot equivalent units (TEU) and modern equipment in their container terminals. They have access networks to their hinterland and computerised management of these terminals is complete or in progress. Except for customs controls, warehouses are not sited in these ports or limited to those terminals that handle conventional goods. Quite obviously, the services provided by this new generation of ports are generally more efficient. Between these two extremes are ports that are still somewhat lagging behind, but that are regularly modernising their facilities to allow for a better organisation and should therefore soon catch up. This is particularly true of the ports of Casablanca and Bejaia, which are both very promising.

Irrespective of the type of infrastructure, all aspects of administrative management, customs controls, container inspections, road or rail access, and work organisation in the port terminal is critical in determining the efficiency of port throughput. For instance, many congestion problems in container terminals could be resolved through better management by port and customs authorities of the procedures and controls involved in international transit. This would also help to reduce the clogging caused by some importers who use the port as a bonded warehouse and leave goods for inordinate lengths of time before withdrawing them. (Euromed Transport Project, 2005).

As for maritime transport itself, national shipping companies are subject to multiple and conflicting regulatory systems. In the Maghreb countries, the existence of national shipping companies of a certain size is seen as a prerequisite for the liberalisation of the maritime transport sector. At present, these countries' fleets are outdated, with high operating costs and poor performance. The new security and safety provisions (International Maritime Organization [IMO], European Union, ISPS Code[1], etc.,) generate investment costs which are too high to contemplate fleet renewal. In these countries, the barriers to entry for a maritime carrier are seen to be very high. Consequently, those in charge of the sector are seeking a regulatory framework that would allow the emergence of private infrastructure which would be able to compete with the northern shore of the Mediterranean. The privatisation of the maritime sector does not, however, mean a purely Maghreb public-private shipping industry (CETMO, 2010; FEMIP, 2009).

In the Maghreb ports, the bottlenecks are more or less all the same: traffic concentration in a small number of ports, cumbersome administrative procedures, long waits inside the harbour and alongside the quay, loading and reloading between ship and dockside warehouses, insufficient drafts, the involvement of several agents which is both time-consuming and a source of conflict, inadequate and/or poorly-maintained cranes and machinery which are often non-compliant with international standards, very small container terminals, institutions and regulations that are unsuited to the changes that globalisation has brought to port operations, working times that are unsuited to the specific nature of maritime activities, poorly-integrated information systems, illegal immigration, poor allocation of port areas, and so on.

Commendable efforts have been made to address these issues. These include major investments, a reorganisation and more flexible regulations with regard to port throughput, and privatisations or BOT (build-operate-transfer) concessions that grant tenders to corporate sponsors, thus obtaining funding for investment plans, especially for public utility infrastructure. It is up to these companies then to recoup their investment by managing the project for a certain number of years. Partnerships between shipping agents and clients may take various forms: a de-monopolisation of the port sector by separating infrastructure management and commercial management (1998 Act in Algeria, 2006 Moroccan Ports Act); the creation of a one-stop

1 - The International Ship and Port Facility Security (ISPS) Code consists of two parts, A and B. It was adopted on 12 December 2002 by Resolution 2 of the Conference of Contracting Governments to the International Convention for the Safety of Life at Sea (SOLAS), 1974.

shop, the installation of scanners, portals and video surveillance, the privatisation of cargo handling in Morocco and Algeria, a reorganisation to overcome cumbersome bureaucracy (ports of Casablanca, Bejaia, etc.), concession of new global ports to large container shipping operators (Tanger-Med in Morocco), efforts to federate all those involved in port throughput by creating port communities (Ghzala, 2011; Santi *et al.*, 2012).

Roads, motorways and road transport

During the last decade, the Maghreb countries have devoted considerable efforts to developing and maintaining their road networks, as well as building new roads to a high standard with major capacity over long distances to facilitate national and international links in Morocco, Algeria and Tunisia. This encourages progress in the logistics of international trade movements (exports and imports). It takes full advantage of road transport, encourages synergies between carriers, greater massing of transport and concentration of stocks in the most suitable logistics sites (EC, 2007-2013).

In most Maghreb countries, road transport, especially national road transport, is still one of the weak links in logistics chains. Similar flaws typical of a road sector in transition may be found in several countries: 1) Very small unprofessional firms (often sole proprietorships or family businesses whose investment capacity is, consequently, comparatively limited); 2) Fleets that are often of poor quality, with routine problems of stowage, overloading, reliability and motorisation; 3) Drivers who are poorly trainednot only in the handling of goods but also in driving itself (highway code); 4) Inadequate road checks, especially with regard to axle loads, stowage methods, speed, etc.; 5) Access to the profession is not always properly regulated or controlled which allows the informal sector to survive and on occasions to dominate; 6) Under-represention of national freight forwarders Subcontracting of transport is common but generally occurs between the shipper (factory or importer) and a small-scale carrier. Freight-flow concentration is still the exception, resulting in low transport productivity and many empty return journeys (Ghzala, 2011; Santi *et al.*, 2012).

Rail transport

Rail transport is present in four countries: Algeria, Morocco, Tunisia and Mauritania. In Libya, projects in progress were disrupted by the Arab uprisings. The Maghreb rail network connects three countries, Morocco, Algeria and Tunisia, but does not always provide an international rail freight service for political reasons (closure of land borders between Morocco and Algeria). However, projects are envisaged to link the railways planned in Libya with Egypt and Tunisia.

Of a quality ranging from average to poor, most of the Maghreb network is single track. In terms of freight, it essentially provides bulk carriage between the mining areas and the ports of export (chiefly for phosphates and other minerals). However, the importance of rail transport for multimodal trade, particularly in general cargo, has made a modest reappearance in projects due to the influx of containers (ONCF-MITA, SNCFT, and so on) (Bouchentouf, 2006).

Most of the countries have rehabilitation and expansion programmes for their networks. Algeria, for example, has an ambitious programme to build a high-speed network, develop the Highlands network and rehabilitate existing networks. Morocco, for its part, has extended its freight and passenger network towards Nador and the new port of Tanger-Med. It has embarked on the creation of high-speed lines (Tangier, Casablanca, and Marrakesh) with the creation of multimodal freight logistics platforms.

Air transport

The Maghreb countries are generally well provided with airports. All the major cities and principal ports are served by an international airport. It should also be borne in mind that almost 50 per cent of air freight uses passenger flights and that a strong tourist sector is an essential asset for the air transport sector. Development projects are in progress in several countries. Casablanca airport has just been provided with an important freight platform entirely dedicated to major courier operators and value-added freight services. A new hub airport, likewise dedicated to international freight (DHL, Fedex, UOS), is planned at Benslimane close to Mohammedia. Other developments are expected at Enfidha in Tunisia.

Air transport is today an important vector of trade and its share in the transport of perishable agricultural products continues to grow (Kingdom of Morocco, 2012; ONDA, 2011; Schlumberger, 2012). Nevertheless, in trade between the Maghreb countries, air freight is still marginal and underdeveloped, although freight services are slightly on the rise. Several air freight segments, such as specific fresh products (fish, fruit and vegetables, etc.) are bound to develop in the future.

Logistics performance in the Mediterranean countries

At global level, there remains a huge gulf between countries in terms of logistics performance, aggravating the disparities in economic competiveness. In 2012, no Mediterranean country appeared in the top ten places of the logistics performance index proposed by the World Bank (World Bank, 2012). France ranked 12th. Of the Maghreb countries, Tunisia ranked 41st, while Morocco moved up from 94th place in 2007 to 50th in 2011. Egypt also moved up from 97th place in 2007 to 57th in 2011. Much lower, in 125th and 137th place of this ranking, out of a total of 155, are Algeria and Libya.

It is often the wretched quality of roads or the predominance of conventional ships which impede these countries from improving their index. The global logistics performance index ranking reflects the perceptions of the logistics quality of each country with regard to the efficiency of customs clearance processes, the quality of trade infrastructure and related transport infrastructure, the ease of organising deliveries at competitive prices, the quality of infrastructure services, the capacity to track and trace consignments and the frequency with which deliveries arrive at their destinations on time. The index runs from 1 to 5, the highest score representing the best performance. The data are drawn from logistics performance index surveys carried out by the World Bank in partnership with university and international institutions, private companies and operators in the international logistics market.

Table 1 - Ranking of CIHEAM member countries according to the logistics performance indicator (LPI)

CIHEAM member countries	LPI	World rank
France	3.85	12
Spain	3.70	20
Italy	3.67	24
Turkey	3.51	27
Portugal	3.50	28
Tunisia	3.17	41
Malta	3.16	43
Morocco	3.03	50
Egypt	2.98	57
Greece	2.83	69
Albania	2.77	78
Lebanon	2.58	96
Algeria	2.41	125

Source: World Bank (2012).

The levers to optimise trade

Customs

The cumbersome nature of customs clearance documentation, the complex nomenclature and the lack of reliable, up-to-date and simplified information, all hamper transport and trade in the Maghreb countries. In order to reduce these barriers and integrate the WTO agreements and free-trade zones, these countries have committed themselves to bringing their customs systems into line with international agreements and European Community directives.

Physical customs checks and phytosanitary checks are the major obstacles to the free flow of agricultural trade. The purpose of the physical control is to check that the goods declaration presented does not include any prohibited goods. Electronic declaration is theoretically possible in all the Maghreb countries (or soon will be), but if it is to have any value, it must totally replace traditional procedures, and must be in advance. In other words, it must precede the goods so that customs can make a decision in advance, even if the goods are only presented at the time of entry (or exit) from the customs territory. It should be based on a nomenclature which is accessible online, and only the references to supporting documents should be provided electronically. The electronic declaration made by an approved declarer provided with an identifier should dispense with the need for physical filing of the declaration. On receipt of the electronic declaration, customs can decide whether or not to allow the goods to pass without a control, and this decision would only be

announced at the last moment. In the event of a documentary control, one can either require an indication of the references of the missing documents or the presentation of the supporting documents themselves, or require the presentation of the goods for a physical check. This latter requirement should be the result of targeting based on a risk profile (risk management) in order to reduce the number of physical inspections which considerably impair flow, and reduce or even abolish random checks. The decision to proceed to a physical inspection is then communicated via the processing system with the information being passed on to customs officers on the ground who carry out the checks (CETMO, 2003 and 2004b; Ghzala, 2011).

The implementation of the electronic declaration is being met with resistance from local customs officers and countless brokers who earn their living from the physical transfer of documents, rather than central administrations or shipping companies. In many countries, visual checkss (the container is opened) or physical inspection (the boxes are opened) of goods exceed 50% of items in transit, and documentary checks are systematic. As in other fields, progress varies considerably from one country to another. Tunisia already has a fairly effective system, and Morocco has also made progress in this sphere.

While operators unanimously agree that the main handicap as far as customs are concerned lies at the borders of the Maghreb countries (Ghzala, 2011), Maghreb customs have nevertheless made remarkable progress while other components of the logistics chain are still lagging behind. Information technology reduces customs clearance times while improving the quality of inspections. The three Maghreb countries have their own systems: BADR (Morocco), SIGAD (Algeria) and SINDA (Tunisia). Difficulties arise in sanitary and phytosanitary checks; in recent times, safety and security have also become an issue (application of ISPS and ICS). In this sphere, procedures are cumbersome, uncoordinated and expensive and, commendable as its efforts are, the customs service alone cannot resolve them.

Box 1: Agro-marketing platforms in Morocco

Agro-marketing platforms are a response to the need for rational agricultural flows between agricultural production areas and consumption areas (grouping of collection from agricultural production areas, channelling to distribution networks and consumer zones). Acting as new centres through which agricultural products transit and as true commodity exchanges for fresh products, these platforms will provide infrastructure (storage, and large-capacity refrigerated warehouses) together with a range of services (handling, quality control and tracking of products, administrative services, banking, etc.), and should help to reduce and standardise marketing costs, ensure cold-chain continuity, traceability and greater compliance with hygiene conditions. The implementation of this network of agro-marketing platforms in major cities will be accompanied by an upgrading of wholesale markets in other towns. These platforms, which will cover an area of 535 hectares by 2015, concern the cities cited below (see Table 2).

Table 2 - Major cities chosen for development of agri-marketing platforms by 2015

Towns	Land in hectares required by 2015
Greater Casablanca	80
Rabat	40
Tangiers-Tetouan	45
Meknes	42
Fez	30
Marrakesh	55
Agadir	55
Oujda	25
Khouribga	12
Settat	23
Nador	17
El Jadida	35
Safi	21
Beni Mellal	22
Taza	18
Dakhla	15
Total	535

Source: Kingdom of Morocco, *National Strategy for Logistics Development Competitiveness*, Ministry of Equipment and Transport, Rabat, 2010.

The Green Morocco Plan

Agricultural export products are an important issue, accounting for 20% of exports in value, coming from a very fragmented, diversified productive system that spreads across the country, transiting chiefly through the ports of Casablanca, Tanger and Agadir. The development of the agro-food sector relies on improving the logistics supply chains, in quality and quantity, for agricultural raw materials and developing logistics platforms close to agricultural hubs.

The Green Morocco Plan on the one hand targets an increase in export value from 8 to 44 billion dirhams in those industries where Morocco is competitive (citrus fruit, olives, fruit and vegetables) and, on the other, the launch of a new wave of investment estimated at an annual 10 billion dirhams by setting up 1,500 projects. In particular, the Plan envisages the establishment of six agro-hubs, three of them close to ports (Souss, Oriental, Gharb), offering a range of logistics services suited to the export of agricultural products.

The parties involved agree on the need to support agricultural export growth by optimising, restructuring and strengthening logistics with regard to agricultural exports. This will be achieved chiefly through better logistical integration of the whole agricultural network and the provision of added-value logistics services, as well as concentration and better grouping of export volumes.

Source: Kingdom of Morocco, National strategy for logistics development competitiveness*, Ministry of Equipment and Transport, Rabat, 2010. This document and a list of the principal commitments undertaken by the parties involved are available on the website of the Ministry of Equipment, Transport and Logistics (www.mtpnet.gov.ma).*

Thinking in a multimodal manner, pre- and post-shipment

With regard to land transport and, more specifically, door-to-door transport, various obstacles hinder the development of multimodal transport. In the Maghreb countries, land transport is predominantly road. To galvanise this sector, the Maghreb authorities have developed institutional and regulatory reforms, including the shift from public regulation to market-based regulation (Morocco in 1999, Algeria in 1987, and Tunisia in 1992). These reforms resulted in the emergence of a plethora of operators, surplus supply, unfair competition, problems regarding professional qualifications, and difficulties in financing fleet replacements. International road transport was the preserve of European operators, as many handicaps impeded the development of this mode of transport in the Maghreb countries. At the level of international private law, there arises a problem of inconsistency between the Convention on the Contract for the International Carriage of Goods by Road (CMR) and the conventions governing the carriage of goods by sea. Added to this is a problem of inconsistency among the legal systems of different states situated on the two shores of the Mediterranean. In fiscal terms, many problems remain. Multimodal transport which, by its nature, concerns several countries and several modes of transport, is often subject to a plethora of taxes. As regards insurance, some states require local importers to take out insurance locally. This practice gives rise to obscure devices to minimise local risk cover. Despite its advantages, the International Road Transport (TIR) regime has proved somewhat ineffective in the Maghreb countries. Moroccan and Tunisian companies suffer, to varying degrees, from difficulties in obtaining visas for their drivers and unjustified checks at the borders of European countries (CETMO, 2004a).

ICT and supply chain management

Information and communication technologies (ICT) are a facilitating factor in international transport. They have engendered new forms of organisation and relations (supply chain management or SCM), creating cross-cutting networks and alliances. With regard to the integration of ICT in Euro-Mediterranean transport and port passage, customs services are being or have been equipped with information and communications systems which can reduce customs clearance times by dematerialising this operation. (BADR system in Morocco and SINDA in Tunisia) (CETMO, 2004b; Ghzala, 2011). As for the management of ships' calls into ports, ICT have begun to spread to all activities in order to make them simpler. Computerised Data

Exchange (CDE) is being installed everywhere. The interoperability of customs and port information systems, which allows information to circulate between heterogeneous systems is being developed (one-stop shop: Tunisia, Morocco, Spain, France, Italy, etc.). As regards land transport, no community information is planned, either in Europe or the Maghreb. However, several projects involving rail links are being developed in Spain, France, Italy, Tunisia and Morocco. Nevertheless, the development of ICT raises various problems: legal rules applicable to "e-documents", insufficient consideration given to the real needs of port operators and trade flows, resistance to change, lack of information and, consequently, difficulties in estimating costs.

Looking to the future

What solutions could be suggested to improve and master agricultural logistics chains and agricultural trade flows (within the Maghreb or the Euro-Maghreb zone)? If the objective is indeed to ensure availability, quality and lower costs, it is essential to provide a framework of safety and quality conditions, since agricultural products demand particular care at all stages, from production to consumption.

Agricultural logistics chains are made up of multiple flows depending on the nature of the products (multi-products). However, the approach is always the same, and consists in reducing the vulnerability and risks inherent to agricultural activities (risk due to uncertainty, stock management, stabilisation of prices in the face of market fluctuations, mastery of space and time to counter speculation while maintaining supply chain masteryand futures markets for products, chartering of ships, containers, etc. Cereals markets should be part of a global logistics strategy (supply, transport, storage, transformation) (World Bank and FAO, 2012; Abis, 2012b). It is to this end that the Moroccan State signed a programme contract with employers (the General Confederation of Moroccan Enterprises, CGEM) to create logistics zones dedicated to imported cereals and others for domestic cereals. Likewise, problems regarding the effective control of the cold chain for fruits and vegetables led the Moroccan authorities to set up logistic activity zones for perishable goods (fruits, vegetables and so on) within the framework of the Green Morocco Plan. The same cold chain strategy is followed in Tunisia.

Whether they exist already or are still under development, these logistic activity zones, destined for agricultural products, are generally linked to a multiform and multi-industry economic activity zone, not far from a port and/or production zone. They need a set of specific collective services to create multiple flow platforms for multiple agricultural products: 1) Customs, phytosanitary checks and safety measures; 2) Access to an information system common to customs, port and airport authorities, economic activity zones, etc.; 3) Access to vocational training for basic occupations (forklift drivers, heavy-vehicle drivers, drivers, dock supervisors, etc.; 4) Presence of a labour pool and a temping market; 5) Presence of specialised equipment (handling, packaging, processing, cold chain, etc.; 6) Access to container management services, refrigerated warehouse maintenance services, vehicle repair services, service stations, restaurants, insurance firms, banks, medical services, etc.

Furthermore, setting up platforms requires a harmonised local supply: lease (five or six years) for warehouse operators with renewals or terminations of leases based on European practices. This involves several private and public operators, hence the need for close cooperation between them that leads to judicious, well-informed choices (Kingdom of Morocco, 2008b; El Khayat, 2008).

Box 2: Motorways of the Sea and European integration

Operating within the Motorways of the Sea concept, fruits and vegetable exports from the Maghreb countries to the European Union are dependent on multimodal logistics cold chains, which consume less fuel and favour intermodal systems (road, rail, sea, etc.).

Transport to and from the ports is a key element for ensuring effective control of the entire logistics chain, guaranteeing smooth traffic flows, preventing transshipment operations, ensuring that conveyances are not stopped (ships, lorries, trains and handling facilities) and preventing an under-utilisation of intermodal transfer interfaces, logistics platforms and dry ports.

The establishment of motorways of the sea should thus include a global logistics system that involves all the components, from the shippers at the point of departure to the recipients at the port of arrival. To optimise this chain and prevent hold-ups and dysfunctions, each stage must be secured and harmonised by having a network of intermediaries throughout the chain that work together or, in other words, an effective logistics chain community.

The MEDA-MoS I and II projects

Launched within the framework of the *Euromed Transport* regional project, the Motorways of the Sea project, MEDA-MoS I, ended in mid-2010. A new programme, MEDA-MoS II, lasting 36 months, started in late 2010, and ended in October 2013. This programme had a budget of six million euros to finance technical assistance measures and individual pilot projects were selected.

The objective of MEDA-MoS II was to facilitate the transport of goods, ensure the integration and efficiency of intermodal links in goods traffic and maritime transport between the European Union and the Mediterranean partner countries, but also among Mediterranean countries themselves. It aimed at promoting interoperability between ports and their hinterland, as well as ensuring the efficiency of logistics platforms, ports and maritime transport connections.

The instruments used to support these networks were diverse in nature. The MEDA-MoS programme provided technical assistance. Additional support for transport infrastructure in neighbouring countries was available in the framework of the Neighbourhood Investment Facility (NIF), with an allocation of 745 million euros for the period 2007-2013. The Trans-European Transport Network projects (TEN-T) focused essentially on direct support for investment in the infrastructure and transport of the member states of the European Union.

To achieve its objectives, MEDA-MoS II needed basic infrastructure to develop intermodality through the creation of appropriate interfaces (sea-rail or sea-rail-road-sea, etc.), hence the necessity of involving both the private and the public sectors in a public-private partnership.

Intermodality operates within a global logistics framework (supply chain) that requires a harmonisation of management and communication tools, thereby ensuring the creation of a professional universe with reference points and a language that are common to all.

To achieve this, all the components of the physical chain should be controlled in an effective way, and a partnership is required between all the parties involved in the agricultural products logistics chain. An information system such as a "one-stop shop" is essential for information to circulate throughout the value chain and thus optimise the supply chain. Finally, it should be accompanied by a Euro-Mediterranean policy on multimodal logistics training with specific reference to the Euro-Mediterranean region (LOGISMEDIA project).

Integration of logistics and infrastructure: the Arab Maghreb Union and the challenge of food security

All the studies and research strongly confirm the idea that the integration of the Maghreb economies is an economic necessity and that this is the only way for these countries to achieve lasting sustainable development (Kingdom of Morocco, 2008a; Sari, 2011; Moré, 2006). Because the agricultural problems that these countries face are broadly similar, coordination could be possible and could indeed enable food security and an effective management of the sector (Abis, 2012a). The EU is conscious of the importance of food security in the Maghreb countries and of the strategic role of agro-food trade to the latter (Agropolis International, 2011).

However, this agricultural trade cannot be developed without logistical and infrastructural integration. As we have seen, the World Bank logistics performance index shows the disparity that exists among the five Maghreb countries and their backwardness in the field of logistics. The infrastructure projects which are currently under development (roads, motorways, ports, airports, logistic activity zones) send a positive signal of as to the possibility of a gradual future integration of Maghreb logistics chains. However, logistics-transport infrastructure will not, a priori, have a ripple effect on Maghreb trade, since it facilitates physical flows but does not create them. The real drivers of the Maghreb integration will be the integrated productive sectors (industry, the agro-food sector, etc.) which generate multiple physical flows and wealth.

Agricultural flows should be built on a basis of complementarity and competitiveness among the Maghreb countries, with an appropriate logistics infrastructure and an institutional framework that ensure food security in the region. A strengthened Euro-Maghreb partnership is a necessary condition for the success of Maghreb integration. Through direct investment by European industries in agro-food production units within the Maghreb countries, it brings into play economies of scale as well as local economy, thus strengthening sustainable development thanks to this geographical proximity. This partnership should be reinforced by real local logistics that involve effective control over intra-Maghreb and Euro-Maghreb logistics costs. This is only achievable through a proactive policy that is common to all levels of transport and logistics (macro-logistics, meso-logistics and micro-logistics) and enables the development of sustainable agro-food logistics.

The development of infrastructure, however, stems from two contradictory approaches:

1) A structural approach supported by the EU, the objective of which is to create a Euro-Mediterranean transport-logistics network comparable to that of the trans-European transport networks. Through a Mediterranean policy of cooperation and good neighbourliness, the EU is increasing the number of projects aimed at upgrading transport and logistics infrastructure with the aid, among others, of the World Bank and the African Development Bank. Institutions such as the Group of Transport Ministers of the Western Mediterranean (GTMO 5 + 5) and the Union for the Mediterranean (UfM) were set up to channel political decisions concerning such projects. At the seventh Conference of Transport Ministers, held in Algiers on 13 March 2012, several important decisions were taken to develop transport and logistics infrastructure in the Maghreb countries. These included stepping up efforts to complete the motorway links of the Maghreb Union and the railway axis; promoting the development of logistics in the Maghreb through the Logismed TA project of the European Investment Bank; and enabling cooperation between the various national logistics development agencies and the private sector active in this field (GTMO 5 + 5, 2012). The UfM (Alfonso, 2013) has incorporated the decisions adopted by the GTMO 5 + 5 Transport Ministers in its projects. Of particular note are:

- The Logismed TA project, and the chapter on logistics training courses for the network of logistics platforms on the southern shore of the Mediterranean. This programme will be spread over six years, from 2013 to 2029. The first phase, running from 2013 to 2016, will involve two Maghreb countries, Morocco and Tunisia. During this phase, transport and logistics observatories will also be set up.

- The UfM is also financing infrastructure connections between motorways in the central Maghreb (Morocco, Algeria and Tunisia): a 22 km section between Oujda and the Algerian border and another 80 km section between Bou Salem and the Algeria-Tunisia border (Alfonso, 2013). The UfM will also finance the Agadir to Ras Jedi corridor. Subsequently, it will consider supporting projects to integrate the motorways of Libya and Mauritania.

Map 1 - The missing motorway links in the Maghreb

Source: Alfonso (2013).

2) An approach that is conditional upon the conflicts, declared or latent, along the southern borders of the Maghreb countries (the Saharan Sahel and others). The transport and logistics infrastructure development projects in the Maghreb countries have resulted in obvious political rivalries and tensions on the borders are still relevant. The land border between Algeria and Morocco is closed, although the Oran region is in the hinterland of Tanger-Med and Nador. Physical flows and the mobility of people are impossible overland.

Box 3: Lebanon and the war in Syria, the need for an alternative approach to logistics

The war in Syria has once again revealed Lebanon's fragility on the geopolitical level. Once more, the bipolar nature of its political components has been strengthened. Geographically speaking, the conflict has revealed how isolated the Land of the Cedars is. This is a real problem for a country where maritime trade was predominant in the past.

An exporting country on the regional market

However, by insisting on this aspect, we overlook the fact that this country is also oriented towards its Arab hinterland. Between March and May 2013, because of the closure of the Syrian border, the territory of the Fertile Crescent (Jordan, Syria and Iraq) became inaccessible to Lebanese trucks. Traffic usually passes through the Beirut-Damascus road, the Baalbeck-Homs or even the Tripoli-Homs one. Despite the Beidar pass at Mount Lebanon, the road that links the two capital cities of the Levant is the one that allows the transport of the largest annual tonnages. However, with the deterioration of the situation, access to these crossings became more difficult, before being blocked by Syria on the pretext of preventing arms trafficking.

Agricultural products have been the most affected by this closure because they are exported to the countries of the Fertile Crescent (Syria, Jordan and Iraq) and to the Gulf. For a long period of time, Beirut served as a transit point for the transport of certain Syrian goods – at least until the ports of Latakia and Tartus became so important in the 1960s after the breakdown of the customs union between Lebanon and Syria. Syria was, in turn, a crucial transit point for agricultural goods exported from Lebanon to Middle Eastern countries and the Arabian Peninsula. Moreover, some of these exports contributed to the renown of Lebanese agricultural products before the Civil War. Lebanese apples were very well known for their organoleptic properties throughout the Gulf but also in Syria and Jordan. Between 1975 and 1990, Civil War interrupted this development by significantly damaging the social fabric and by affecting agricultural territories and chains. Furthermore, the reconstruction of the country focused more on the tertiary sector than on the productive sectors. Thus, agriculture could not regain its reputation in the region. Yet, despite all obstacles and the substantial losses of the Lebanese agricultural trade, export remains valuable to certain sectors (apples, apricots, vegetables, citrus fruits, bananas and potatoes).

A niche agricultural strategy thwarted by the Syrian war

Before the Syrian crisis reached dramatic proportions, Lebanon was attempting to regain its market share through a five-year strategy (2010-2014) implemented by the Ministry of Agriculture to boost employment in the agricultural and agro-industrial sectors. By making the most of its agro-climatic diversity, Lebanon hopes to develop niche productions that would allow it to integrate the Arab market and meet the

demands of Lebanese consumers at the same time. For this purpose, the budget of the Ministry of Agriculture has been increased while other ministries also support agriculture. The Ministry of Economy supports the grain sector and the Ministry of Finance subsidises the tobacco industry. The Investment Development Agency of Lebanon (IDAL), attached to the Prime Minister, has been given greater resources to increase export subsidies for agricultural products and thus support niche markets.. Within this framework, agreements have been signed with certain countries, such as the agreement on banana sales with Jordan. This strategy proved to be quite effective – between its implementation and the beginning of the year 2013, Lebanese exports increased by 20%, according to the Lebanese Ministry of Agriculture (the question remains of how imports have evolved).

The closure of the Syrian borders in the spring of 2013 slowed down the Lebanese agriculture. The Akkar region, which is poor and largely agricultural, is particularly at risk. Potato producers in this area were very much concerned in the period just before harvest time. These concerns were also shared by farmers in the Bekaa Valley, the primary agricultural region in Lebanon, and by farmers in the South of the country, a region in which agriculture is becoming increasingly important.

Within this context, Lebanon has decided to set up new export channels for agricultural goods. In early May 2013, a shipping route was opened in Beirut for the transportation of agricultural products to Saudi Arabia and Jordan via Egypt, another important market for Lebanon. Three Ro-Ro ships (Roll-On, Roll-Off) have been put into service by the Falcon Shipping SAL, on the basis of two to four shuttle services per week. Another shipping route has been established between Lebanon and Mersin in Turkey and then on to Iraq. However, using sea freight as a "flow path" poses a certain number of problems; in particular, the cost remains higher than that of road transport. In addition, the system is so complex that this "flow path" can only be used as a temporary, or at least secondary, solution.

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Conclusion

The Euro-Maghreb logistics chains that are being developed could attract powerful groups, mainly American and Asian ones, provided that they reap benefits from future revenues generated by these agro-food logistics chains (FMES, 2011; Gharbi, 1993; Cheriet and Rastoin, 2010). If the network is not taken under control by Euro-Maghreb interests, the western Mediterranean will become subject to non-Mediterranean global firms.

Faced with the possibility of such a scenario, there is an urgent need for a Mediterranean solution that allies public and private stakeholders in order to develop a Mediterranean agro-food logistics network, the purpose of which will be to facilitate a fair and successful integration of the interests of private and public operators on both sides of the Mediterranean.

Solutions can be found (EIB, ADB, Euro-Mediterranean private banks, public and private funds, etc.), innovative financing must be sought and the creation of a Euro-Mediterranean agro-food logistics community should be encouraged to unify divergent interests on the two sides of the Mediterranean (El Khayata, 2008). The Maghreb countries are invited to find their place within the Mediterranean space and the

Euro-Mediterranean zone in particular. However, even if trade patterns between the Maghreb countries and the EU Mediterranean countries have somewhat changed, they still do not encourage the emergence of an additional zone with an international and horizontal division of labour, nor do they encourage fair trade.

In the light of this, the logistics infrastructure and resources are a gamble on the effective integration of the Maghreb countries in a wealth-generating Mediterranean which will be more than just a transit zone for East-West traffic. Financing the infrastructure and trade facilitation services in the Maghreb countries will be worthless without the emergence of a development centre that guarantees food security.

History teaches us that development will necessarily require the desire to build an integrated Euro-Maghreb economic zone, in command of its productive systems and its surpluses for the benefit of its "Euro-Maghreb citizens". The future of these Euro-Maghreb logistics areas depends on this political will. If it is lacking, these logistics areas will be mere transhipment and transit places, thereby destroying any hope of making them a place where agricultural surpluses are produced and having fair trade at regional level. It would then become difficult not only to guarantee food independence in the Maghreb countries but also to ensure peace in the Mediterranean.

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CHAPTER 7

THE GEO-ECONOMICS OF THE AGRO-FOOD TRADE BETWEEN THE ARAB MEDITERRANEAN COUNTRIES AND THE GULF

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The countries of the Gulf Cooperation Council (GCC)[1] did not see their food supply interrupted between 2007 and 2008, despite the drastic rise in prices for agricultural raw materials[2] during this period. Nonetheless, they grew aware of the risks that food shortages can have on socio-political balance. Previously considered as a plague affecting solely poor countries, the global nature of food insecurity was revealed when the Gulf countries, accustomed to obtaining their supplies on the international market, with the exception of Saudi Arabia, found themselves faced with this unprecedented threat. The Gulf states may not be recognised as facing food insecurity in its commonly accepted definition at the international level (Breisinger *et al.*, 2011); however, they are vulnerable to it, at least in terms of physical availability.

These countries have among the highest GDP per capita in the world, yet their national strategy takes into account the decline in oil revenues. Furthermore, the food issue has become a larger concern as the import bill for agricultural products continues to grow, rising from 14 to 35 billion dollars between 2000 and 2010 (FAOSTAT, 2013). Natural constraints and societal changes (changing diets, together with the growth of low-wage expatriate populations) place an additional burden on this food equation that is increasingly eluding policy makers in the region. The challenge that the Gulf countries are facing is thus closely linked to

1 - Founded in 1981, the GCC comprises Saudi Arabia, Oman, Kuwait, Bahrain, the United Arab Emirates and Qatar.
2 - According to the FAO, the food price index rose by 105% between 2003 and 2008; over the same period, the cereal index increased by 142%.

the issue of how resources, both natural and financial, are used and to the infrastructures that are available to economic stakeholders in order to secure food supply in this region.

Internationalisation and relocation of the agro-food production

Given the exponential growth of the amount of food imports, and constrained by the huge water poverty that characterises their territory, the Gulf oil-monarchies intend to ensure a large proportion of their food security through land acquisition and the purchase of farms in countries endowed with better land and water resources (Blanc and Brun, 2013). These political and financial initiatives[3] cover a wide range of countries such as Pakistan, Sudan, Kenya and even Argentina (Paris, 2009)[4], but also Arab countries such as Egypt. The internationalisation of land, agricultural and food issues has long been a key element of the domestic policies of the Gulf states. Thus, Saudi Arabia launched a major restructuring plan of its agricultural sector after the 1973 oil crisis, in order to respond to the threats on export restrictions issued by large agro-exporters, but also to stabilise relations among tribes in the kingdom. In 1974, the Saudi kingdom produced only 3,000 tonnes of wheat; yet, by 1984, it was self-sufficient and in 1992, it became the sixth largest wheat exporter. However, desert greening through huge investment has shown its limits, both economically, with the procurement price of wheat being three times the international price, and environmentally, due to the unsustainable exploitation of water resources. It should also be noted that the kingdom's dependence has shifted from major agricultural producers to input and machinery suppliers.

Having planned the complete cessation of its wheat production by 2016, Saudi Arabia will have to import wheat in large quantities in the future[5]. By so doing, it will be reconstructing the strengths and the agribusiness strategies of other countries in the region, such as Qatar, who intends to use its agricultural policy as an instrument of influence through its National Food Security Programme (QNFSP), promulgated in 2008 (Brown, 2013). This programme aims to reduce the country's dependence on imports through food self-sufficiency and the development of local, sustainable agriculture. Agricultural production in the emirate should in the long term cover 60 to 70% of market requirements, provided that the processing and distribution systems become more effective thanks to scientific and technological progress. To achieve this, Qatar is already planning to invest hundreds of millions of dollars to develop research, production and processing infrastructures. The emirate intends to pool this research with other countries that are similarly exposed to strong natural constraints.

3 - Examples include King Abdullah's initiative for Saudi agricultural investment abroad, the launch of Hassad Food by the Qatar Investment Authority, etc.

4 - However, many investments remain mere announcements. It should also be noted that although the Gulf countries invest on the grounds of food security, they sometimes speculate in land which they do not use for agro-food production.

5 - According to the FAO, the amount of wheat available for Saudis in 2009 was around 2.3 million tonnes, i.e. 90 kg per person per year.

The role of Arab Mediterranean countries in the Gulf states' strategies

The global projection of the Gulf food security issue has an impact, commercially and logistically speaking, on relations with the Arab Mediterranean countries and their immediate vicinity. Companies in Qatar and in the United Arab Emirates (UAE), for instance, are showing particular interest in arable land situated in the Arab Mediterranean region (Blanc and Brun, 2013). By 2007, Al Dahra, a company based in Abu Dhabi, had concluded lease contracts with Spain and Egypt in order to produce up to 50% of the fodder it needed. The group has also established a foothold in Morocco in the olive oil sector, and exports or re-exports part of its production to its Gulf neighbours or to emerging markets in Asia. Prior to the termination of the land allotment contract by the new Egyptian authorities, the Saudi firm Kadco had acquired the lease for over 40,000 ha in the region of Toshka, located on the west side of Lake Aswan, in a pharaonic project aimed at debottlenecking the Nile Valley. Another prized area for Gulf agro-investors is Sudan, more specifically the northern part of the country, with its quest for new currencies since the split in July 2011. This area offers vast reserves of arable land and is an ideal location from a geographical point of view (Woertz, 2011; Blanc and Brun, 2013).

However, these investments might affect regional geopolitics, and at times might even place the Gulf countries in contradictory positions with their regional economic and political partners (Al Ahram, 2010), namely with Egypt. Indeed, infrastructures on the Nile, and more particularly the construction of dams for purposes of irrigation of Sudanese land is a worrying subject for Cairo because of the possible impact on its already hampered project in wheat self-sufficiency. It should be noted that Egypt is particularly sensitive to the sharing of the Nile waters (Blanc, 2013; el-Menawy, 2013). Incidentally, Cairo does not hesitate to seek assistance from the Gulf countries in order to hinder any funding proposals coming from international financial institutions for the construction of dams upstream from Egyptian territory.

As the Egyptian case demonstrates, the Gulf monarchies use their diplomatic relations with North African countries deliberately, and at times contradictorily, in order to promote agro-food trade and investments. The Gulf states, together with Morocco, have been working since the beginning of 2013 for the establishment of a common fund for food security of almost a billion dollars (*Maroc Hebdo*, 2013). At the International Agricultural Fair of Meknes (SIAM), in April 2013, Miguel Angel Moratinos, Spain's former Minister of Foreign Affairs, reiterated the strategic importance of agricultural issues, and did not hesitate to acknowledge the benefits of the Green Morocco Plan for food security in the Sharifian kingdom. Qatar's diplomatic adviser, who is notably in charge of the launch of the Global Dry Land Alliance (GDLA) initiated by Doha, called for a renewed regional cooperation to provide quick answers to this global challenge. His presence at the International Agricultural Fair of Meknes is a further indication of the emirate's interest in Morocco and its neighbour, Algeria. The economic and political stability of these countries appears as a strength in many respects to Qatari investors, while relations between the emirate and Tunisia or Egypt

are more complex and changing following the "Arab spring", as revealed by the calling into question of the land allocation contracts in Egypt.

Morocco's and Algeria's valuable mineral resources (phosphate resources) are all the more attractive to Qatar since it will need to secure its inputs supply if it intends to pursue its goal of food self-sufficiency as stated in its food security plan. A partnership was launched in January 2013 between Algiers and Doha regarding the construction in Algeria of a complex that will produce nitrogen and phosphate fertilisers. The two countries have also entered into joint ventures in various sectors, such as petrochemicals and agriculture. These examples show the closer economic ties that now exist between these two countries that hold many similar positions with regard to regional security issues. Qatar also plans to renew its cooperation with Morocco: in June 2013, it offered to invest in the development of the agricultural sector in return for the export of part of its production to the emirate. Although one should remain cautious as to Qatar's announcements, it cannot be denied that food and agriculture are becoming increasingly important elements in diplomatic relations between the Gulf states on the one hand and Northern African countries seeking investors on the other.

Several complementarities exist in terms of agricultural trade and logistics between the Gulf states and the countries on the southern shore of the Mediterranean. For many federations of agricultural producers, the growing food markets of the Gulf countries offer promising opportunities for selling their goods. The region is no exception to the global trend towards the regionalisation of trade (Subran *et al.*, 2013) concerning agro-food products that have the advantage of being easily transported and that present fewer risks to health when transported on shorter distances. A growth in non-oil trade between these two regions may thus be observed, with Moroccan exports to the UAE notably increasing by 300% between 2011 and 2012. Although the Moroccan agricultural production is still largely oriented towards the European Union, the opening of a sea route between the ports of Tanger-Med and Jebel Ali in Dubai – which is under negotiation – should enable Moroccan products to find new opportunities and be re-exported to the emerging markets of Asia and East Africa. The visit of Morocco's Minister of Agriculture Aziz Akhannouch in April 2013 in Abu Dhabi testifies to the mutual interest and the opportunities for commercial cooperation that exist between the UAE and Morocco.

Logistics in the Gulf: between competition and pooling of resources

The Gulf monarchies, as leading hydrocarbon exporters, have always paid particular attention to issues of transport and logistics. The risk to natural gas or oil exports, resulting from the specific geopolitical and diplomatic tensions in this region, also applies to agro-food imports. The Gulf states' exposure to the vagaries of agricultural markets, together with the instability of trade routes from Central Asia[6], a major

6 - If the agro-food imports from Central Asia (Kazakhstan, Kyrgyzstan, etc.) are not flown to the Gulf states, they have to cross Iran, the Caucasus and Afghanistan. This poses a threat to supplies destined for the Gulf region.

cereal producer, are pushing Gulf leaders to forge closer ties with their Mediterranean cousins. Both Qatar and the UAE have made logistics the pivotal point of their regional and even global power. The Gulf countries are nonetheless unequally endowed in port, airport and commercial infrastructure. Thanks to the pioneering vision of the Emirate of Dubai and to its considerable investments in this sector, the UAE is currently the main logistics hub in the Middle East. Among the major achievements of the federation, the creation of the first free trade zone in the region of Jebel Ali (JAFZA)[7], centred around the state-of-the-art port that has the same name and the Al Maktoum International Airport, has enabled Dubai, and therefore the UAE, to expand their trade network beyond the Gulf States by establishing connections with East Africa and also with the Indian subcontinent. The federation relies on Emirates Airlines, recognised as one of the best airline companies in the world; its subsidiary, SkyCargo, is targeting agro-food transport and planning to set up in North Africa in order to meet the demand for meat and fresh produce. The UAE has also created a "trader" that should, sooner or later, be able to compete with grain giants such as Cargill, Dreyfus and Bunge. Moreover, by hosting *Gulfood*, the world's largest annual international agro-food fair, Dubai is strengthening the federation's position and its strategic influence in the fields of food processing and product distribution.

These efforts demonstrate the importance of securing the entire food supply chain and confirm the federation's leading role in relation to its neighbours. Inspired by Dubai's success, other GCC countries have undertaken to catch up and develop their own infrastructure. Oman, with its strategic geographic location, and Saudi Arabia, whose economic and demographic power remain unchallenged, appear as two serious alternatives to the hegemony of the UAE in the field of logistics. The rise of Qatar, whose diplomatic weight is constantly growing, should not be underestimated. Thanks to its economic growth, its natural gas reserves and its "chequebook policy", Doha is developing its own logistics infrastructures in an integrated approach that could truly make it indispensable in the region. This activity is managed by Logistics Village Qatar, an autonomous pole which provides a range of supply chain services for a variety of market sectors. The first free trade zone was established in 2006 near the Doha International Airport; other free zones should be established in the vicinity of industrial and commercial areas.

Infrastructure investments constitute one of the main axes of the Qatar National Vision 2030. By 2016, they are expected to represent almost 40% of the emirate's budget and should include the construction of a new international airport together with a deep-water port covering an area of approximately 20 km^2, comprising five cargo terminals and four container terminals. Driven by the wish to diversify their economy, Qatar's leaders have made a bold move by orienting the country towards the future. By drawing on both its strengths and weaknesses, the emirate should become not only a commercial platform, thanks to its ultra-modern infrastructures, but also a scientific and technological platform through its research programme on food self-sufficiency and also through the Global Dry Land Alliance. The Gulf states

7 - To date, there are over ten free trade zones in the United Arab Emirates. These areas attract many international investors.

may seem engaged in a race against time and may give the impression of being in fierce competition among themselves in terms of daring innovations and initiatives; however, they also intend to make a joint, shared response to the imperative issue of food security through the above-mentioned mutual fund between Morocco and the GCC, the creation of a grain reserve system as well as an agricultural innovation system common to the GCC countries.

Conclusion

The Gulf countries are redoubling their efforts, both nationally and internationally, to achieve food independence by securing supplies and even by producing food locally. Faced with strong markets, those countries whose financial resources match up to their ambition are conceiving innovative pro-active policies, such as massive investment in logistics and infrastructure, strategic political alliances, and funding of agronomic research aimed at developing agriculture in arid countries... In light of these initiatives, the ultimate purpose of which remains uncertain, it is essential to pursue our reflection on the agro-food issues specific to this region in order to support the transition towards sustainable patterns of consumption and production.

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CHAPTER 8

TRADE AND LOGISTICS: THE CASE OF THE GRAINS SECTOR

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Exploring the trade routes for cereals in the Mediterranean proves to be quite an exciting adventure. It is a real journey across time to observe economic dynamics in a region with a history of several thousands of years where grain has always been a driving force in the history of societies, powers and trade. It is about going through complex paths where a multitude of actors, professions and infrastructures work together to embody a cereal sector whose strategic dimension is based on demographic, geographic, agricultural, food, logistics and financial determining factors. Lastly, this chapter examines the geopolitical inticacies (Abis and Blanc, 2012) related to the acceleration of agricultural globalisation and the financialisation of vital commodity markets.

It is obviously difficult to tackle all the issues that revolve around grain trade in the Mediterranean. This paper rather aims at emphasising the acuteness of the issue of logistics. In a global context of strong tensions on agricultural markets and rising food demands, the cereal sector is increasingly exposed to the logistics issue. After recalling some basic points on grain trade and its development, this chapter primarily focuses on countries situated on the southern Mediterranean shore that are major grain importers and where the improvement of logistics is a major issue.

Grain trade: permanence, development, and perspective

The contemporary global context is marked by heightened tensions on agricultural and grain markets. Since 2006-2007, the price of cereals is indeed not only characterised by a gradual rise but also by increasing fluctuations and volatility. In Chicago

or in Rouen, the price of wheat is scrutinised with the utmost attention by public and private importers coming from all over the world. Whether they work in the export or import sector, the main activities of grain traders include monitoring crops in exporting countries, preparing tender proposals and defining specifications and financial calculations.

The major international dynamics

The increase in grain prices can be explained by a multitude of factors. Population and economic growth is largely responsible for this development. There are more mouths to feed and more meat to produce – resulting from transformed food patterns, thus heightening the global demand for grain. Three quarters of soybeans and corn and half of the wheat produced in the world are now used to feed animals. After the productive success recorded during the second half of the twentieth century, the years 2000 were characterised by a relative stagnation of yields, more frequent climate-related natural disasters and growing speculative phenomena. Over the past ten marketing years, that is, between 2003-2004 and 2012-2013, the global grain production has been lower than consumption for four times. In the case of wheat only, this situation occurred five times, or once every two years!

Inevitably, these differences between what the earth produces and what the world consumes affect the markets. Even if only a hectare of grain over six participates in international trade, crop failure in one of the granaries of the world has an immediate impact on the markets. In the case of wheat, approximately 20% of the production is exchanged on international markets and up to 35% for soybeans. As in 2007 and 2012, the markets were particularly agitated during summer 2012: drought in the United States and the Russian plains gave a serious heatstroke to cereal prices. Betweens May and August 2012, the price of wheat increased by 40% and that of corn by 30%. Accompanied by strong variations, these prices that are part of an upward trend are powerfully attractive for venture capital. If the financialisation movement of agricultural markets existed for many years, it has accelerated with the liberalisation of public policies since the 1980s. It has also become more complex since the outbreak of the international economic crisis in 2007 (Valluis, 2013). That said, one should not forget that monitoring the thermometer is as important as finding a remedy. Popular anger indeed frequently falls on speculators who are perceived as the source of all evil but the real problem lies in the fact that the world does not produce enough cereals to meet demands. This creates a situation of uncertainty that attracts speculators, thus increasing the risk of strong price fluctuations. The mass influx of cash related to the monetisation of the astronomical debts in developed countries often leads financiers to identify new sectors for investment: the "guilty" are not necessarily those we believe they are... Given this inflation and increased price variability, UN agencies were particularly concerned about the potential impact on importing countries and the world's poor populations. However, these tensions also reveal shortcomings in the regulation of agricultural markets, despite the action of the G20 that set up, the AMIS (Agricultural Market Information System) in 2011 under the aegis of the FAO. This information system on the state of production,

consumption and stocks of cereals is expected to prevent crises[1] with the aim of alleviating the effects.

Nevertheless, in the long-term, international institutions are quite clear about the solutions to be found: the United Nations Food and Agriculture Organisation (FAO) and the Organisation for Economic Cooperation and Development (OEDE) estimate that agricultural production must increase by 60% by 2050 (FAO and OECD, 2012)! However, this increase will be constrained by a limited expansion of cultivated land especially in North Africa and the Middle East (MENA region) where the vast majority of arable land is already being exploited. Therefore, the two organisations believe that the increase in production will have to be implemented though improved productivity. In this regard, they call for investment in research, support to small farms and above all, a reduction of losses. This last point is at the heart of the Mediterranean cereals sector's issues because the logistics problem is undoubtedly the main growth factor of the cereals available in the region. Neither the conquest of land and nor the improvement of local yields seem to meet the increasing needs. Trade and infrastructure optimisation will be the driving forces of an improved food and grain security.

Over-dependence on grain in the Mediterranean region

The Mediterranean basin is one of the world grain epicentres. The riparian countries are still very large consumers while some of them, like France, are leading producers. North Africa and the Middle East (MENA)[2] especially concentrate about 35% of world cereal imports and 30% of wheat only, each year. The limited availability of land and water, together with the inter-annual and inter-seasonal weather changes are major constraints for these countries. The probable decrease in rainfall and the rise in temperatures will increase tensions that will weigh on the perspectives of local production development of these countries. Moreover, the IPCC (Intergovernmental Panel on Climate Change) assessments drew attention (and perhaps deepened the concerns...) on the effects of climate change in the Mediterranean region and its agricultural crops. It is important to add that the population increase complicated the equation. Although in the second half of the twentieth century, successive governments (Lerin, 1986) have implemented agricultural development policies headlining grain farming, it is clear that production has not been able to keep up with the rising demand.

Between 1960 and 2011, in the MENA region, the three-fold increase in production contrasts with the six-fold increase in the consumption of cereals! This phenomenon is explained by a very specific human demand. In fact, even today, a North African consumes twice as much bread per year as a European and three times more than

1 - The AMIS (*Agricultural Market Information System*) is an aggregated system of statistical data on the state of grain trade set at the initiative of the G20 and then chaired by France in 2011. It much first help improve the transparency of agricultural commodity markets through the establishment of a database whose data is supplied by local projects. Then, the role of the AMIS is to encourage the coordination of public political actions against the uncertainties of the market. This is made possible by an alert system, or rapid response forum when a case of abnormal market conditions is identified.

2 - Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates and Yemen. These countries represent approximately 5% of the world population.

the world average. This growth in domestic demand also depends on the increase in animal feed needs. Changes in lifestyles in southern and eastern Mediterranean societies did not spare eating habits. Plates are fuller in the beginning of the twenty-first century than in the past with a more frequent presence of meat products. Again, the Mediterranean illustrates this global phenomenon. When the share of grain supply used to feed livestock was only 1% in the beginning of the 1960s, it currently exceeds 30%. In order to meet these increasing domestic needs, agronomic performances remain disappointing compared to those of other regions in the world. From 1961 to 2010, the world average grew from 1432 to 3564 kilograms per hectare of harvested land areas. This yield is largely exceeded by the European Union and North Africa while in the MENA region yields are well below; some Arabic countries have even lower yields than in Sub-Saharan Africa. The difference between yields in Morocco and Algeria and those in China is striking while in the early 1960s the yields were closer. Egypt, where the entire crops are irrigated, is an isolated case: the development of these annual grain yields roughly follows that of France, although a slight decrease is observed since the mid-2000s.

The combination of these different dynamics explains the increasing, structural and strategic recourse to grain imports in the MENA region. The volume has surpassed 70 Mt since 2010, a figure that is 23 times the quantities of cereals imported in the beginning of the 1960s. The countries of this region now account for a third of the global purchases. The domestic cereals needs of this region are met by more than 70% through imports in most countries.

After Japan, Egypt ranks as the second major importers of the world (6% of total imports). This dependency ratio goes up to over 85% in Lebanon, Libya and Jordan. If we take the example of wheat, Egypt is the world's largest importer, followed by Algeria in the 5th position and by other Arab countries ranking among the top 25 (Morocco, Iraq, Turkey, Tunisia, Libya, Yemen, Saudi Arabia and Soudan). Countries of the MENA region have imported an average of 45 Mt of wheat since 2008-2009. Even the volumes of corn are increasing, reaching up to 20 Mt over the past campaigns. Each country simultaneously adopts a singular behaviour: schematically, each one of them has a purchase structure of its own and operate in a unilateral way: a state grains buyer such as the GASC (General Authority for Supply Commodities) in Egypt – the world's largest public importer – or like in Morocco, they is a plurality of private actors; the criteria of price and quality vary according to the importers.

Besides, the quantities imported should also be combined with the average price of a tonne of grain in order to grasp the extent of the economic costs brought by such a dependence on international markets. As regards North African countries[3] where the coverage ratio for grain has rarely exceeded the symbolic threshold of 50% since the 1980s, the amount of purchases amounted to about 12 billion dollars in 2012. The weight of this grain in these Nations' scales of payments becomes unbearable (Hallam and Balbi, 2012) especially if we add the amount of food subsidies (most of which target cereals used to make bread) and if we consider the narrowed

3 - Algeria, Egypt, Libya, Morocco and Tunisia. These countries represent approximately 5% of the world population.

economic margins they make since the outbreak of the Arab uprisings since early 2011. In the case of Egypt, food requirements and the financial security of agencies in charge of imports are at the heart of strategic discussions aiming to call for external assistance since the revolution of February 2011, especially vis-à-vis the International Monetary Fund (IMF). Besides, bread is a food essential with an important cultural and religious significance (Essid, 2012). It is also a determining link between people and political authorities. It is therefore important to highlight the threat of socio-political cyclones that swirl around the issue of grain and food insecurity in the Mediterranean (Abis, 2012; Zurayk, 2011). Even if the beam of causes is quite broad, it is impossible to eliminate the vulnerabilities of the explanatory factors that have contributed to the uprisings taking place across the Arab world since 2011.

Prospective analysis for grain trade

If it is not possible to detail and to nuance the regional landscape a bit more, it is important to remember that the strategic importance of grain is growing and becoming more complex in the MENA region. Emerging trends could be identified, enabling the analysis of long-term perspectives.

Countries are asked to review their agricultural strategies and to strongly re-include the food component in their national security objectives. Resistant to institutional and political uncertainties, the need for food for a population requires policy makers to find all possible responses to alleviate risks. Although the recourse to external supplies is an irreversible process, there are still certain levers regarding domestic production and food chain efficiency that should be activated. Rather than exhausting themselves in a desperate attempt to increase national production, if the vast majority of the MENA region countries invest financial and human resources in the agricultural sector, domestic productivity will undoubtedly increase in the coming years. Even better, aiming to reduce losses and waste, these countries can re-gain sovereignty. If food self-sufficiency is an anachronistic concept, nevertheless, the optimisation of grain chains and the increase in storage capacities can contribute to the improvement of food security in these countries.

Very few countries have sufficient grain volumes to export part of them. Others, like India, can do it occasionally or more regularly like Russia, provided that the crops benefit from the mild climate and that logistics are indisputable. Nevertheless, certain Nations have the capacity to supply the rest of the planet each year. This is case of the United States, Canada and France for example. Yet, with stocks tending to reduce, the fluctuations of export capacity increasingly heighten tensions in the market. While the global demand is gradually growing, the production and export quantities experience much less linear curves. Being higher and more volatile than in the past, prices increasingly determine grain trade. As in the rest of the world, in the Mediterranean region, geostrategic competition between different powers of the grain sector is therefore once again exacerbating (Abis, 2012).

The last projections of the FAO (Alexandratos and Bruinsma, 2012) announce that in order to meet the world demands for grain in 2050, approximately 3,000 Mt of grain should be produced (1,850 Mt have been produced in 2011-2012), half of

which will be used for non-food uses and two thirds of which will be consumed in developing countries. For the latter, the grain deficit, that is, the gap between domestic production and demand would then amount to 200 Mt. In that case, the MENA region with 114 Mt and Sub-Saharan Africa with 56 Mt will confirm their ranks as the first world grain importers. Superimposed to global food and economic dynamics, this grain over-dependence will lead to an intensification of the geopolitical dimension of grain trade in the Mediterranean.

Consequently, buyers compete with each other on all fronts: crop quality and pricing structure (price of grain, ocean freight, insurance, etc.) but also logistical responsiveness, ship loading capacity or even diplomatic support (as old as the world, the power of grain remains relevant). As a result, the list of countries exporting grain to the MENA region is becoming longer. With approximately 35 Mt in 2011-2012, the region around the Black Sea ensures nearly a third of world wheat exports. Thus, Ukraine increasingly wins calls for tender launched by Tunisia, Morocco, Lebanon or Jordan while each year, Kazakhstan strengthens its position as the largest flour exporter. Besides the specific relations maintained with Syria, Russia deploys its trade strategy towards Egypt: during the past recent year, more than half of Egypt's wheat supply was imported from Moscow. There is therefore a reason behind Russia's decision to modernise the Black Sea's port facilities: Moscow is very aware that the improvement of the logistics system will enable the country to conquer additional market shares in the Mediterranean (Riabko, 2012). Lastly, it is important to consider the hypothesis that these three countries (Kazakhstan, Russia and Ukraine) build a cereal pool in the Black Sea in order to have more influence on the markets. This dynamic has undoubtedly an impact on Mediterranean importing countries.

Besides, other countries like Brazil, Mexico, Germany or Argentina sometimes invite themselves to the banquet of grain in the Mediterranean. This proliferation of actors in the grain sector is a further illustration of a globalised agricultural trade in the case of MENA region countries. In this context, in order to remain one of the major trading partners, Europe should be vigilant. In fact, the Mediterranean basin proves to be a preferred destination for wheat exported by the European Union. In 2011-2012, out of the 14.5 Mt sold to third countries, 40% of European wheat was exported to North Africa, 24% of which was exported to Algeria. This amount corresponds to the proportion that this region represents in the total EU exports year after year. France exports half of the amount of wheat coming from the EU to third countries – especially Mediterranean ones – that occupy a very important place[4]. France can rely on the performances of its grain logistics to sometimes succeed in placing larger quantities of grain on markets that are traditionally turned to other sources. Thus, in the summer of 2010, when Russia decided an embargo on the sales of wheat, Egypt, which was its major client, imported wheat from France. Thanks

4 - With a production of about 35 Mt of wheat per season, France exports between 15 and 18 Mt. Half of these volumes is exported to third countries, mainly Algeria, Morocco and Egypt. By aggregating data, it appears that an average of 15 to 20% of the wheat produced in France landed on the southern shores of the Mediterranean during the last marketing years. On the European and world markets, one third of the total exports of French wheat is exported to North Africa.

to its agro-trade vitality that is mainly based on port grain terminals such as Rouen[5], Dunkerque or La Rochelle-La Pallice, France managed to meet Egypt's demand.

Cereals are often perceived and treated as a commodity. Nonetheless, their fungibility is not absolute. This qualitative issue is reflected in the broader perspective of international trade: if a French miller perfectly knows how to benefit from French wheat, this is not necessarily the case of the Turkish, Egyptian or Libyan miller. Both exporters and importers share this issue. The producer's challenge is to achieve a maximum attainable yield and to ensure a yield that will find good value on the domestic market or for export. The buyer's challenge is to find merchandise that will meet his needs at the best price possible. For instance, if the quality of the crop is unsuitable for export (this is highly related to weather conditions during harvest and therefore remains unpredictable), trade commitments will be difficult to meet. The countries that would like to continue playing a significant role in the southern and eastern shores of the Mediterranean will have to take the more demanding specifications into consideration. These specifications will include the necessary adaptations for crop varieties and for the quality of grain mobilised for economic and geostrategic purposes by these exporting countries. Yet, in terms of quality, international competition is increasing and the export sector cannot afford not to get organised to meet demands, at least those of its customers. What was relevant in the past, in the context of the Cold War (Morgan, 1979) when the ideological struggle was predominant, will be also relevant in the near future in a world where the geopolitics of vital resources and the rivalry for access to food will increase.

If this qualitative (and sanitary) aspect plays an important role in the daily life of world traders, buyers and importers, other risks tend to multiply: the price risk (unit price and exchange rates) of course, but also the counterparty risk. The management of commercial operations will therefore become increasingly difficult. In this perspective, the trust relationship between buyers and sellers – and therefore, by extension, between exporting States and importing countries – are severely tested. Multi-commercial commitments, technical support on infrastructural level and the constant adjustment of production according to the changing needs of clients will be undoubtedly decisive for a grain cooperation marked both by trade and development. In other words, human relations will remain crucial in the practice of these grain sector professions. Is this to be considered as a stimulating factor for Euro-Mediterranean relations?

Trade and logistics: inseparable levers for the strengthening of food security in the Mediterranean

Logistics is a natural and necessary corollary for grain markets. The reconciliation between production and food needs has always been a crucial issue for the development of societies and their food supply. For example, the Roman and Egyptian

5 - It is important to recall that Rouen is the first port grain terminal in Europe, with loads of about 8 Mt for each marketing year. Two thirds of these exports go to North Africa.

empires were built around their agricultural supremacy and their ability to feed and supply their armies. There are several structural explanations behind this. The port of Ostia played a fundamental role in meeting Rome's cereal logistical challenge. A third of the city's food supply came from North African countries. The Romans had not only invented a standardised model for army camps, roads or urban areas. Recognising the importance of cereals to ensure social peace in the city, they also invented a model type of granary to stock their grain (the "horreum").

Rediscovery of the importance of optimised logistics

There are several structural explanations. First of all, grain markets are characterised by a highly fragmented productive structure that requires the development of a distribution network in order to supply the multiple consumption centres of a geographical area; this is inevitably achieved through the construction of transport infrastructure (roads, railways, harbours), storage facilities as well as the establishment of an efficient legal framework (ensuring the right to property and its protection). This infrastructure network should also be highly flexible: harvest variability and therefore the variability of sources of supply must be taken into consideration in order to ensure the supply of a food demand that is more or less unyielding.

Then, there is a strong temporal dimension that should also be considered: most cereals are harvested only once a year while they are consumed daily. An efficient industry must be able to create buffer stocks to ensure a continuous distribution throughout the year. In addition, there is also a qualitative dimension: the stored grain is still a living material and their integrity must be maintained in order to remain consumable over time.

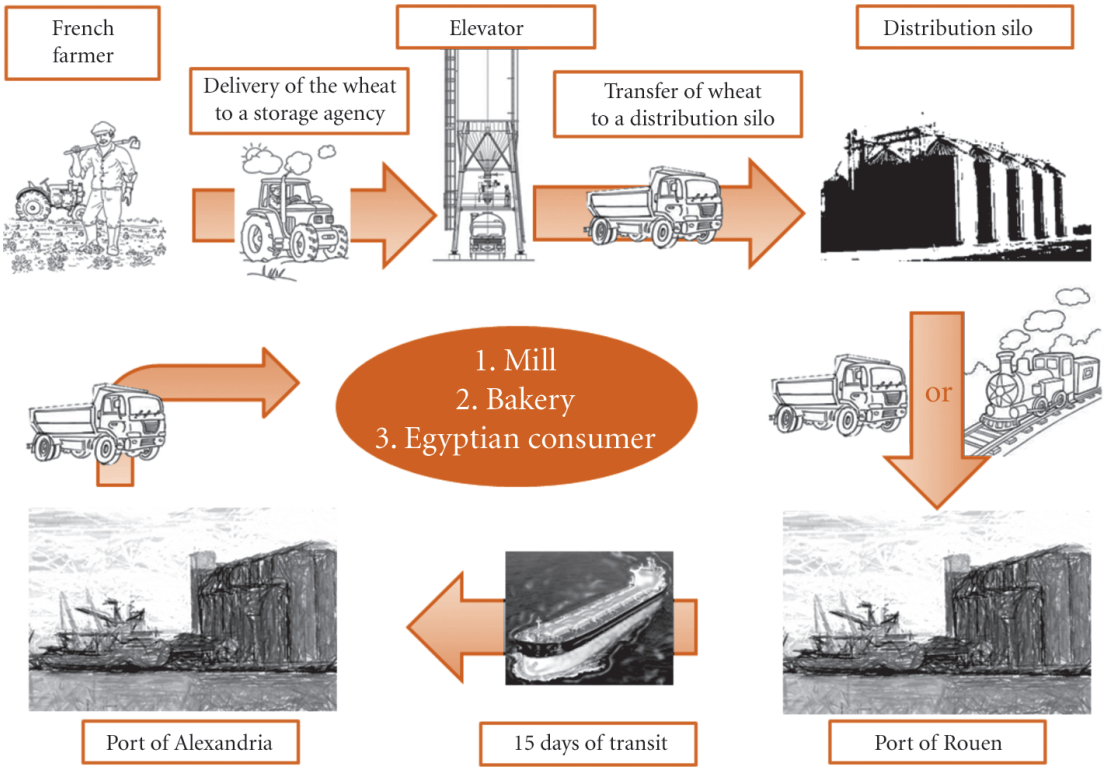
Lastly, the geographical dimension is an issue that is increasing with the development and growing complexity of societies. Transferring grain productions from food surplus areas to food deficit areas has become a real challenge from the moment societies have abandoned hunting and gathering. The transition to agricultural societies and even more so, the transition to sedentary industrial societies brought by the need to trade agricultural commodities and thus establish adequate logistical infrastructure. This need has become even greater with the globalisation and urbanisation movements that have increased the distance between the areas of production and consumption. The current population growth in regions where food supplies are limited like in North Africa requires the strengthening of the functioning of supply chains.

Journey on the grain route

Stressing the importance of logistics is not enough. It is also necessary to understand the complexity and the multiplicity of steps that enable a grain of wheat to travel from the field to the consumer. Market organisations differ according to the history of agriculture in each country. Thus, depending on the region, once the wheat is harvested, the farmer will sell and deliver his yield to a first collecting and storage organisation that can be either a cooperative (France, Denmark, Algeria, Germany), a capitalist private operator (England, Romania, Spain, Tunisia, Morocco), or a state structure (Egypt).

This delivery can be made in bulk in countries where agriculture is developed or in jute bags in areas whose productive structure is more fragmented. The delivered grain must be weighed on a "certified" scale and analysed in order to ensure that both parties are assured they comply with the quantitative and qualitative terms of trade. This will create a favourable context for trade and production. Thereafter, road, rail or even river transport infrastructure will be solicited for the production to be delivered to a silo distributer that will bulk the grain procurement, sort it out and then distribute it to the first processing industry: miller, animal feed manufacturer, semolina producer... This buyer himself will control the goods upon arrival to ensure that the raw material meets his needs; he may then recur to an analytical laboratory. Although grain trade is primarily domestic, for many years, there has been a strong development of global trade requiring better connections with different regions of the world. For example, the world wheat trade that represented less that 50 Mt in the early 1960s now exceeds 130 Mt. The world corn trade amounted to 20 Mt in the early 1960s, now exceeds 90 Mt. Yet, grain trade is not a trivial thing: it requires suitable port infrastructure (enough draft to accommodate ships), facilities for loading and unloading ships (cranes, gantry cranes, sucking pipes, conveyors, transporters...), storage facilities to maximise transit, controllers to ensure the quality of loading and unloading operations. This is the case for both import and export harbours. The efficiency of these facilities depends on the quality of their connection with the in-land network.

Figure 1 - The journey of a tonne of wheat produced by a French farmer to an Egyptian consumer



Source: InVivo.

Improved connectivity to cope with an increased dependency

The global market is not homogenous: it is composed of the sum of multiple micro-markets that are connected through a network of logistics infrastructure. An area that is disconnected with other areas is like a production that fails to find its outlet or a population that has no access to food. Without appropriate logistics, trade and market re-balancing mechanisms no longer work. The latest crises of high prices of 2007-2008, 2010-2011 or 2012-2013 have highlighted the need to strengthen the supply chain. The balance is weaker and availabilities are relatively weaker at the time of demand. It is therefore necessary to establish channels that will allow the world to transfer cereals from where they are available to the regions where they are needed, at the right time.

Box 1: What would be the ideal grain logistics situation for an importing country?

In order to understand the inefficiencies that may exist in some countries, we can draw a comprehensive picture of the ideal situation with regards to grain supply policy. The importing country should be able to accommodate very large ships (60 kt to 90 kt) in its harbours in order to minimise the cost of freight; then, it has to be able to unload ships very quickly to reduce the time of stop-overs thanks to advanced port facilities while the storage capacities should be sufficiently dimensioned. Then, the inland transport network (road and railway) should be in a position to effectively supply the primary processing industries or in-land storage centres. Of course, this should be accompanied by minimised losses during the transit of goods and the financial conditions should be optimised thanks to a banking system that functions properly. Besides, the risks of supply disruption should be minimal. This in turn limits volatility in local markets and also the needs to conserve security stocks. As it is essential to recognise the fact that thanks to optimised logistics, a country's need to have large stocks to minimise the risk of disruption would be smaller. This reduces de facto the financial costs required to manage the sector.

This is why, today, in the producing countries, there is a real struggle for the control over the collection of grain by international trading companies. For instance, in Canada, Viterra was taken over by Glencore, in the United States the cereal collector Gavilon was repurchased by the Japanese trader Marubeni and in Australia, GrainCorp has been taken over by ADM. This is necessarily accompanied by the development of storage capacity that is able to "capture" the grain production. The challenge is there indeed: it is necessary to seek production increasingly farther and to develop the tools to deliver it where it is needed at the lowest costs possible. Meanwhile, exporting countries are actively implementing major investment projects in logistics infrastructure with the aim of gradually optimising the competitiveness of the grain export sectors. The United States have deployed impressive railway structures capable of handling trains over several kilometres. In Brazil, President Lula had launched massive investments in the early 2000s in order to reduce logistics bottlenecks and improve port infrastructure. In France, the public investments will approximately amount to 350 million Euros between 2009 and 2015 for the only port of Rouen, the first European grain terminal. This port will then be able to

accommodate larger ships. Lastly, in Russia, projects to improve the port infrastructure on the Black Sea, the Sea of Azov, the Caspian Sea or even on the Baltic-Arctic Front are flourishing. All these dynamics are part of a global context characterised by power games and rivalries over the control of raw materials. Like other food products, grain is at the centre of this new geopolitics of resources (Lee *et al.*, 2012).

In the Mediterranean, where food needs are growing, more than elsewhere, the production deficit increases the need for adequate infrastructure. Yet, it seems that the wheat import sector remains severely crippled (FAO and World Bank, 2012). Thus, the high cost of inland transport is responsible for an increase in the grain bill of 7% in Tunisia, 12% in Morocco, 21% in Egypt and 40% in Jordan. A better connectivity with the world would enable these countries to significantly reduce the import bill. To address the issues of the supply chain's effectiveness, it is very pragmatic to estimate the cost, time and reliability of the connection between the country of import and the consumption areas. The major costs are related to the ability of the chain to quickly transfer the grain cargo from the export areas to the consumption centres (i) to bulk the flow in order to maximise the economies of scale, (ii) to limit losses along the supply chain (iii).

In the south of the Mediterranean, there are several factors contributing to the increase in the grain import bill. In North African and Middle Eastern countries, the majority of port infrastructures are too small while their import requirements would require an increase in bulk imports. In North Africa, only Egypt and Morocco are able to accommodate ships of 60,000 tonnes (in Algeria the port Djen Djen is underutilised). Libya, Tunisia and Algeria can only accommodate ships of 25,000 tonnes or at best, 40,000. The difference in costs is huge! For instance in Egypt in April 2013: a cargo ship of 60,000 tonnes coming from France cost between 14 and 15 dollars per ton. For a ship of 25,000, the cost is close to 25 dollars per tonne. When the 10-dollar difference is related to the 15 million tonnes of imported grain, one can better understand the considerable amounts this represents.

Besides, this need to bulk the flows grows with the distances needed to transport grain. In the case of wheat, for a long time, the proximity of European granaries (Black Sea, European Union) has facilitated the management of import volumes in small volumes. On the other hand, today, the emerging increase in forage needs to feed animals requires wheat that comes from more distant regions. It is therefore difficult to ignore the United States or South America when one seeks to import corn and even more when one needs to import soya and its by-products. Today, this issue is mitigated by the low cost of freight. Since the past four years, the maritime transport conditions for the dry materials market is in a situation of overcapacity in a difficult global economic context and where the increase in prices remains the norm. Nevertheless, the fact that the sector is of a highly cyclical nature should be kept in mind. It is important to remember that in the early 2008, while grain prices were at their peak, the freight rates between Rouen and Algiers exceeded 40 dollars per tonne when, in 2013, they are hardly above 20 dollars per tonne. In 2007-2008, the overheating of maritime freight prices accentuated the violence of the price increase observed in the grain market. History might repeat itself and the

best way for importing countries to protect themselves against this kind of situation is to optimise their ability to accommodate ships and unload them as rapidly as possible.

It is the dimensioning of these local logistics infrastructure that allows both local production and imports to find their way to the consumers. Inland transport is crucial as it irrigates zones of consumption and decongests the entry points of grain. In fact, we often forget that the costs of inland transport are at least as important as maritime freight costs to deliver goods to the consumer. For instance, in France, it costs almost as much to transport wheat from Eure-et-Loire to Rouen than to transport wheat from Rouen to the Algerian coasts! In North Africa, the transport of grain is mainly done by road; however grain trade has to cope with the daily constraints of traffic congestion in cities. This predominance of road transport over aging (or inexistent) rail infrastructure is partly explained by the subsidising of petrol in several countries. Nevertheless, in times of economic and budget crisis, the transportation of agricultural commodities is affected by the weakening of this public support mechanism. The case of Egypt in 2013 is a striking example: due to the rise in fuel prices, local harvested products are unable to reach zones of consumption thus undermining the balance of the local grain market.

Prospective analyses for grain logistics

In the food sector, especially the grain sector, several Mediterranean countries have decided to invest in the development of storage facilities and infrastructure. This objective can be explained both by national imperatives (to reduce post-harvest grain losses thus reducing the import bill) and by fears vis-à-vis the international tensions. While the investments in storage capacity have been relatively modest over the past twenty years, they are currently developing. The multiple virtuous dynamics of a network of storage capacity have been rediscovered today. As for import chains, the adequate port storage facilities maximise the transit of goods. Thus, ships have enough space to unload their cargos when they arrive in the port. This minimises the costs and reduces losses. It might seem surprising but very often, a port is more perceived as a gateway than a "residence for wheat". Ideally, an importing country should seek to reduce transhipment operations between the port and the primary processing industry in order to reduce merchandise management costs. However, the scarcity of land resources in ports leads to additional costs for major storage compared to in-land storage. This is why today, the United States invest in distribution silos within the country as a strategy to maximise the transit in port silos and transport the goods to the inland areas at a lower cost. With an investment in port storage infrastructure shared between the private and the public sector and a strong impetus for state investment in domestic storage redistribution with a plan for fifty silos, Egypt is an example of this strategy.

In addition, we rediscovered the fact that the development of adequate storage facilities allows easier access to the market and stimulates the production, thus reducing dependence on external inputs. This requires master plans for the collection that often involves the establishment of intermediary storage centres, or, directly, primary processing industries. These allow to structure and organise a chain, which ultimately

enables the producer to make better profits from his work. Local production should also meet the needs of local industry in a qualitative way. A Moroccan, Algerian or Egyptian miller often turns his back on local wheat due to qualitative or sanitary incompatibility with his needs. Yet, it is in this collect centre that the buyer guides the producer-deliverer to adapt his production according to the consumers' needs. At the same time, the collector will also seek to evenly distribute the products he receives from the multitude of operators in order to better serve the existing demands. This is the opposite of Jean-Baptiste Say's famous law of markets according to which, supply creates its own demand: if there is no connection between the producer and the market, this virtuous dynamic put forward by the French economist at the end of the eighteenth century cannot be created. Thus, in the MENA region, the collection rates, i.e. the rates of commercialised products are very low; Morocco is the only exception with a system that has many flaws but which collects more than half of the production while in Tunisia, the rate falls down below 50% and 30% in Egypt. Besides these issues related to the distribution chains, the issue of the conservation of these domestic crops is also crucial. In North African countries, conservation is a big problem: in Egypt, it is said that more than 10% of the grain collected is lost due to the lack of adequate infrastructure. In Algeria, since 2009, the year when grain production reached a record level of 6 Mt, awareness was raised on the lack of storage capacity. In Egypt, the main agricultural bank, which is also the main crop storage organisation, has been debating with the government to stimulate a new investment plan in the sector for many years. It seems that the multiplication of crises of high prices in the agricultural market has been a strong argument to engage proactive policies in this direction. When Egypt is planning to modernise storage areas in "villages" (*Shunas*), in Algeria, 39 silos will be established in order to manage domestic crops.

More broadly, these issues should be put in the Mediterranean strategic context, characterised by increasing food insecurity and heightened concerns. In this region, the agricultural and food policies are among the central pillars of social policies. Government intervention is therefore very important, often at the same level as food subsidies. In a context where the high prices of grain accentuate the weaknesses of food products and increasingly weigh on public finances, the sectors' management costs can also be decreased thanks to optimised logistics. In addition, the volatility of cereal prices leads the countries to reduce the impact within their national territories. In fact, holding stocks and the ability to carry them does not allow States to completely isolate themselves away from the turmoil of international markets. Nonetheless, firstly, this can be considered as a tool helping reduce the risk of disruption (thus avoiding to add domestic volatility to imported volatility). Secondly, it can allow the countries to obtain some flexibility in procurement strategies in order to take advantage of situations when prices are low or on the contrary, to dampen the impact of very high prices. These concerns have found a significant resonance in the G20 summit of the 22-23 June 2011 in Paris where the issue of the link between food supplies and price volatility has been widely debated. The visibility given to this issue has encouraged many countries to continue their investment in storage infrastructure. Since the early 2000s, in Egypt, a program of construction of fifty new silos is being implemented in

addition to the project of improving storage in villages and import infrastructure. The objective is to be able to stock the equivalent of up to six months of consumption (4.5 Mt). In Algeria, in addition to significant infrastructure development, public investment plans for 2010-2014, provide for the extension of storage capacity. In Morocco, the development strategy is not less ambitious. As for Tunisia, the development strategy promoted before the revolution lost impetus but the needs remain sustainable.

Often guided by public forces, these structuring strategies also involve private operators: traders, millers and semolina producers... Private operators show a real interest in storage investments when the State provides space for development. If storage is not the transformer's primary aim (he is more inclined to reduce inventory carrying costs), he may invest in the sector to ensure a better supply. In Egypt for example, since the emergence of the non-subsidised bread chain, private operators have heavily invested in storage infrastructure both in ports and within the country. In Morocco, the government encourages investment in collection infrastructure through storage subsidies. These examples should encourage governments to question the balance to achieve between public and private spheres in order to ensure food supplies for the population.

The limited and inadequate logistics in most southern and eastern Mediterranean countries are therefore a real problem in terms of food security. More generally, they cripple the development of these States. With the globalisation of trade, logistics has become an important vehicle for economic competitiveness. Capable of pulling up a country or a company's growth, its effectiveness depends on public policy, investment, infrastructure, transport, innovation and training. Logistics can help open up some territories and to better connect them to the rest of the country or the world. Moreover, in the Mediterranean region, logistics must increasingly integrate issues of environmental sustainability. The anchoring of a country to the dynamics of globalisation therefore requires a number of logistical skills, related to both the control of time and the management of space. In order to reach such an ambition, international cooperation, primarily at Euro-Mediterranean level, is crucial. Mediterranean countries should collaborate to stimulate synergies in terms of logistics and make their infrastructure facilities complimentary. These statements on this particular subject repeat what all experts conclude with regards to the Mediterranean and what the CIHEAM had summed up in its prospective report in 2008 through this simple statement that remains sorely relevant: "either collaborate or weaken separately" (CIHEAM, 2008).

Conclusion

In addition to the interesting information provided on cereals and their trade throughout history (Collaert, 2013), the main objective of this chapter was to put grain at the heart of the issues of Euro-Mediterranean cooperation that should increasingly focus on the development of relations and infrastructure related to food security. This is certainly a crucial prerequisite for a successful economic and social transition in this region (Breisinger *et al.*, 2011; Sakala *et al.*, 2012). Being the region

of the world that is most dependent on external supplies and this tendency will grow in the coming years, the Mediterranean is inevitably forced to better control the costs of its grain purchases. This can be achieved by giving priority to securing imports (financial capacity, relations with suppliers and market operators) and optimising the sector's logistics.

Being essential for southern and eastern Mediterranean countries, this challenge aims at reducing losses, enhancing storage capacity, overcoming the domestic production deficit, facilitating the transport of grain and limiting the financial burden dedicated to the purchase of grain. If awareness seems to have been raised during the past years, logistics require the mobilisation of material resources on the long term in order to be efficient, modern and competitive. Far from resolving all issues, logistics can help reduce food and political risks. By matching supply and demand, it can facilitate the trade of this strategic product while promoting international technical cooperation. This is a field for a mutually beneficial partnership between the Mediterranean shores.

If the Euro-Mediterranean remains a long-term geopolitical ambition, each step taken towards a greater multilateral solidarity in this region is most welcome. The idea of developing a Mediterranean component of the AMIS system (Agricultural Market Information System) is an encouraging step in the right direction. However, this proposal from the 9th ministerial meeting of the CIHEAM's members countries held in Malta in September 2012 is not enough. As regards food and grain, complementarities and responsibilities should be at the heart of debate in the Euro-Mediterranean region at a time when the world is going through the restructuring of its geo-economic and agricultural balance. Knowing how to produce better, being able to produce more but also decide for whom to produce are three dimensions of the same Euro-Mediterranean grain strategy where trade and logistics would be perceived as levers for this region's food security and geopolitical stability.

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CHAPTER 9

TRADE AND LOGISTICS: THE FRUIT AND VEGETABLES INDUSTRY

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The international fruit and vegetables market was among the first markets of the agro-food sector to wholeheartedly embrace globalisation (Compés López, 2012). The reduction of trade barriers, shipping costs and travel time, together with the improvement in methods of preservation of perishable goods, investment in specialised terminals in ports and expansion of markets, have led to a spectacular growth in the trade of fresh fruit and vegetables since the end of the twentieth century (Cook, 1997).

This chapter presents an analysis of the dynamics of the trade in fruit and vegetables in the Mediterranean, by type of product and destination[1], with a focus on the developments taking place in the European Union (EU-27), Morocco and Egypt. This study will give a broader insight into the logistical issues related to the trade of these goods and the importance of performance in terms transport and infrastructure for the sector's competitiveness.

This analysis will therefore focus on the ability of the countries to enter new export markets and to modernise a production chain where the distribution efficiency is constantly tested (organisation, networking, indirect services, etc.). It is important to remind that the fruit and vegetables sector is characterised by two distinctive features: the strong seasonal nature of production schedules and the great fragility of rapidly perishable crops which therefore require well managed trade flows, from the place of production to the place of consumption.

1 - For this analysis, the reference data were elaborated on the basis of the average of the two years 2000-2001 and 2010-2011 using the UN-COMTRADE statistical sources and Eurostat (COMEXT data) for data on the EU. The product codes used for extracting the data are SITC Rev 3. The data refer to categories 054 (fresh vegetables) and 057 (fresh fruit).

Dynamics of the trade in fruit and vegetables in the world

International trade in fresh fruit and vegetables amounted to some 250 billion dollars in 2010. This amount has increased over the last ten years, both in terms of exports, with an average annual increase of 10.5% and imports, with an annual rise of some 9.6%.

In the case of fresh vegetables, international trade reached a value of about 106 billion dollars in 2010. It has increased over the last ten years by an annual average of 10.7% in exports and 9.6% in imports. The EU-27 plays an important role in this trade, accounting for 42.5% of global exports and 47% of imports of vegetables. However, its market share has been declining in recent years. In 2000-2001, the EU-27 represented 50% of global imports and exports. Consequently, despite an increase in the trade in vegetables in absolute terms, trade flows in the EU are lower than in the rest of the world. China, for example, imported 3% of the global value of vegetables (against 0.4% in 2000) and exported 11.3% of this value in 2010 (against 6.6% in 2000).

While maintaining high market share, the leading export countries in 2000 such as Spain, Mexico or the Netherlands, have lower rates of growth than those recorded at global level or by certain countries whose share of the vegetable trade has increased. Thus, Canada, Germany, the Russian Federation and some southern Mediterranean countries such as Egypt, Turkey and Morocco, stand out with an export growth that is higher than the global average. However, the three Mediterranean countries have respectively reached a share of export in 2010 of 2%, 1.5% and 1.2%, while imports grew strongly in the trade flows of the Russian Federation, Turkey and Germany. Thus, like the United States, Germany and the United Kingdom, these countries maintain their positions as major importing countries.

With regards to global trade in fresh fruit, a trading value of about 150 billion dollars was recorded in 2010, with a growth of almost 10.2% for exports and 9.6% for imports between 2000 and 2010. In this sector, the EU-27 also occupies a leading position, accounting for nearly 33.5% of exports and 46.4% of imports. However, its share has declined in the last ten years, considering that in 2000, exports and imports accounted for 37% and 50.8% respectively of global trade. The major market share held by certain countries in global exports of fruit should be emphasized here: 14% of the flows are concentrated in the United States, followed by Spain with 9.9%, Chile 5.6%, Italy 5.1%, and the Netherlands 5.1%. These trends confirm a strong growth of exports to countries such as Chile, the Netherlands, China, Iran, South Africa, Egypt, Turkey and the United Kingdom. Regarding imports, the major buyers are mainly the United States (12.4%), Germany (9.2%), the United Kingdom (6.1%), the Netherlands (5.3%) and France (5.1%). It is in China, Iran, South Africa and Turkey that imports have increased the most significantly.

Table 1 - Trade flows in fresh vegetables in the world

	2000 Millions of dollars		2010 Millions of dollars		AAGR %	AAGR %
	Export	Import	Export	Import	Export	Import
World	**19,287.19**	**21,143.32**	**53,585.15**	**52,738.93**	**10.76**	**9.57**
EU-27	*9,345.67*	*10,580.98*	*22,763.71*	*24,671.20*	*9.31*	*8.83*
Netherlands	2,708.19	990.46	6,737.39	2,021.46	9.54	7.39
China	1,265.43	90.42	6,031.27	1,557.72	16.90	32.93
Spain	2,432.73	596.58	5,288.10	1,215.23	8.07	7.37
Mexico	2,136.02	180.04	4,320.64	397.79	7.30	8.25
United States	1,795.83	2,891.15	3,663.42	6,857.03	7.39	9.02
Canada	1,076.86	1,041.27	3,362.57	2,333.73	12.06	8.40
France	1,048.27	1,337.06	2,319.18	3,032.01	8.26	8.53
Belgium	1,088.68	723.51	2,297.98	1,586.08	7.76	8.17
Italy	682.83	689.41	1,672.16	1,684.62	9.37	9.35
Germany	366.89	2,727.20	1,082.59	5,634.77	11.43	7.53
United Kingdom	230.93	1,903.44	496.36	3,832.37	7.95	7.25
Russia	19.61	322.06	62.32	2,204.17	12.26	21.21
Turkey	258.21	101.89	1,065.37	308.95	15.23	11.73
Egypt	81.64	180.19	814.79	430.33	25.87	9.10
Morocco	170.86	47.26	620.23	59.07	13.76	2.26

AAGR = Average Annual Growth Rate
Source: UN-COMTRADE.

A first analysis of the global data shows a change in the geography of trade flows in fruit and vegetables, with the emergence of new countries, which are gradually transforming the international market's map and the decline of traditional importing and exporting countries. Unprecedented trade routes are being mapped out, leading to a reorganisation of commercial services and logistics. We should also highlight the influence of certain countries such as Chile, New Zealand and South Africa, which, despite their geographical position at the antipodes of the globe, they are important trading powers in the sector. Their production is highly intended for exports and their logistics strategy is based on a highly efficient maritime and port chain (Compés López, 2012). Indeed, the competition from new emerging markets in the food sector, especially fruit and vegetables, has focused on highly service-intensive products and made technological innovation crucial to international competitiveness. Transport and logistics have thus become the principal driving forces of a dynamic process of globalisation where economic, political and social relations must necessarily be part of a wider geographical landscape. Consequently, the degree of interdependence between geographical zones will be strengthened and enhanced by the development of communication networks, the efficiency of logistics services and technological advances. Logistics must also meet the challenge of the increase in the volume of goods, the geographical dispersion of production zones and the distance between the place of production and the place of consumption.

Table 2 - Trade flows in fresh fruit in the world

	2000 Millions of dollars		2010 Millions of dollars		AAGR %	AAGR %
	Import	Export	Import	Export	Import	Export
World	**26,950.46**	**30,989.37**	**71,309.64**	**77,230.89**	**10.22**	**9.56**
EU-27	*9,934.07*	*15,757.27*	*23,863.72*	*35,861.35*	*9.16*	*8.57*
United States	3,870.65	4,570.10	9,951.93	9,585.27	9.90	7.69
Spain	3,199.04	670.71	7,086.19	1,924.78	8.28	11.12
Chile	1,191.73	46.08	3,987.67	97.64	12.84	7.80
Italy	1,796.99	1,140.62	3,648.34	2,592.36	7.34	8.56
Netherlands	1,048.85	1,442.61	3,625.04	4,279.32	13.20	11.49
Belgium	1,453.94	1,525.04	2,809.81	3,300.17	6.81	8.03
China	348.36	367.05	2,410.98	2,061.86	21.34	18.84
Iran	461.72	2.27	2,308.87	570.72	17.46	73.80
Mexico	720.67	454.22	2,212.10	673.93	11.87	4.02
South Africa	569.63	20.72	2,110.39	73.63	13.99	13.52
France	1,183.50	1,993.10	1,900.53	4,058.31	4.85	7.37
Germany	311.01	3,666.91	1,413.40	7,085.98	16.35	6.81
United Kingdom	82.56	2,495.92	259.47	4,746.43	12.13	6.64
Turkey	1,003.13	67.11	3,445.10	312.83	13.13	16.64
Egypt	57.43	67.57	926.48	197.59	32.06	11.33
Morocco	231.98	12.94	523.98	124.12	8.49	25.37

AAGR = Average Annual Growth Rate

Source: UN-COMTRADE.

Lastly, it should be noted that, nowadays, effective logistics are essential to the organisation and competitiveness of the fruit and vegetables sector in the context of a retail market, which increasingly requires the development of a continuous flow system.

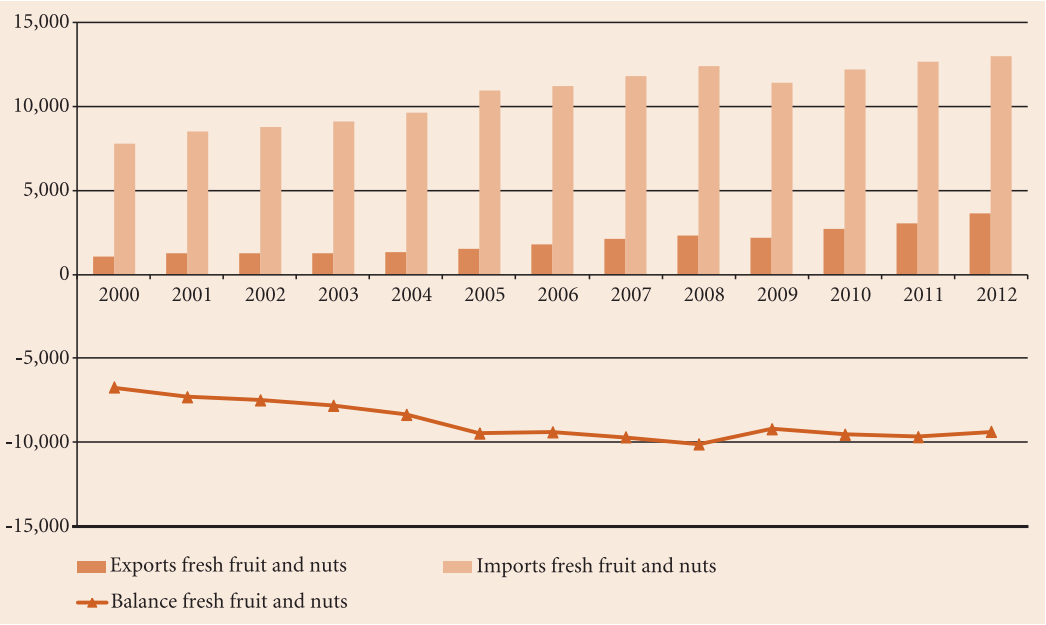
The EU, a major player in the trade in fruit and vegetables

In the last ten years, the trade balance of the EU-27 for fresh fruit and vegetables recorded a constant deficit, revealing a fluctuating trend with an average trade deficit of some 9.8 billion euros over the period and an average annual rate of 2% variation. According to the Eurostat's absolute data, exports in this sector are growing slowly but steadily, reaching 6.5 billion euros in 2012 (while they were estimated at 2.2 billion euros in 2000).

The same trend is confirmed for imports, which increased from 10.1 billion euros in 2000 to 16.5 billion euros in 2012. The average annual change rates, calculated for the period 2000-2012, show that exports grew by 9.36% while imports increased by only 4.17%.

The same trend is observed in the fresh fruit and nuts sector. Here again, during the last decade, the trade balance of the EU-27 showed an increasing deficit, averaging some 8.7 billion euros and an annual average change rate of 2.81%. Exports show a slow but steady growth that reached 3.6 billion euros in 2012 (against 1.1 billion euros in 2000) and imports increased from 7.8 billion euros in 2000 to 13 billion euros in 2012. Despite the trend in absolute values, the analysis of average annual change rates, calculated for the period 2000-2012, again indicate an increase in exports (10.6%) and a lower growth in imports (4.4%) (Figure 1). It should be noted that the evolution of the import flows of tropical fruit (bananas, pineapples and nuts) in particular, contributed to the deficit in the trade balance, which remained stable for other fruit products.

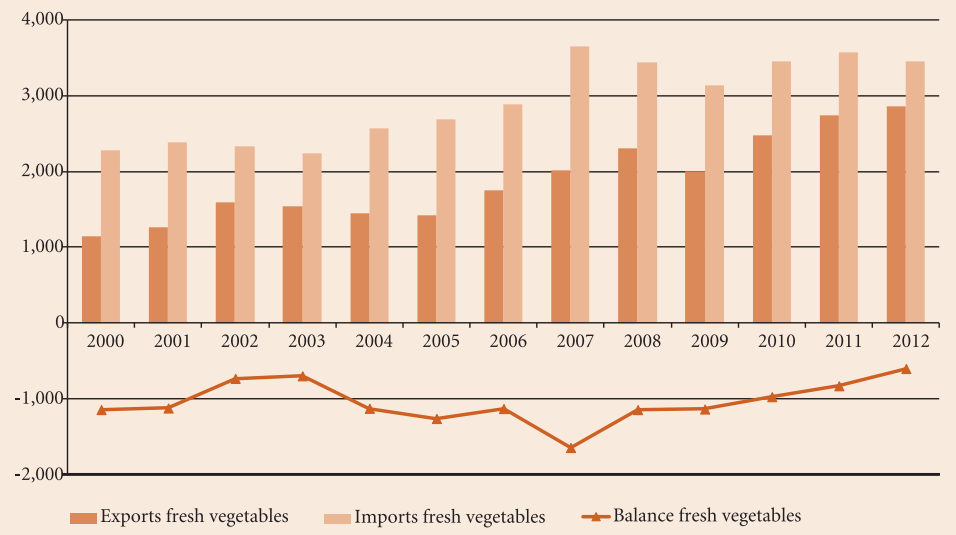
Figure 1 - EU-27-trade in fresh fruit and nuts (in millions of euros)



Source: Eurostat, COMEXT data.

While the trade balance has continued to worsen in the fruit sector, the situation seems to be different for fresh vegetables. Over the period considered, imports and exports of fresh vegetables almost doubled, but their evolution is much more balanced. On average, the trade balance showed a deficit of about 1 billion euros, but with an average annual change rate of 5.2%, thus indicating a clear decline in imports. The absolute figures show an increase in the sector's exports, reaching some 2.8 billion euros in 2012 (against 1.1 billion euros in 2000). The trend in imports is variable to the extent that they increased from 2.3 billion euros in 2000 to 3.5 billion euros in 2012. Here again, the analysis of the annual average change rates, calculated for the period 2000-2012, highlights the differences in growth: exports increased by almost 8% while imports increased by only 3.5% (Figure 2).

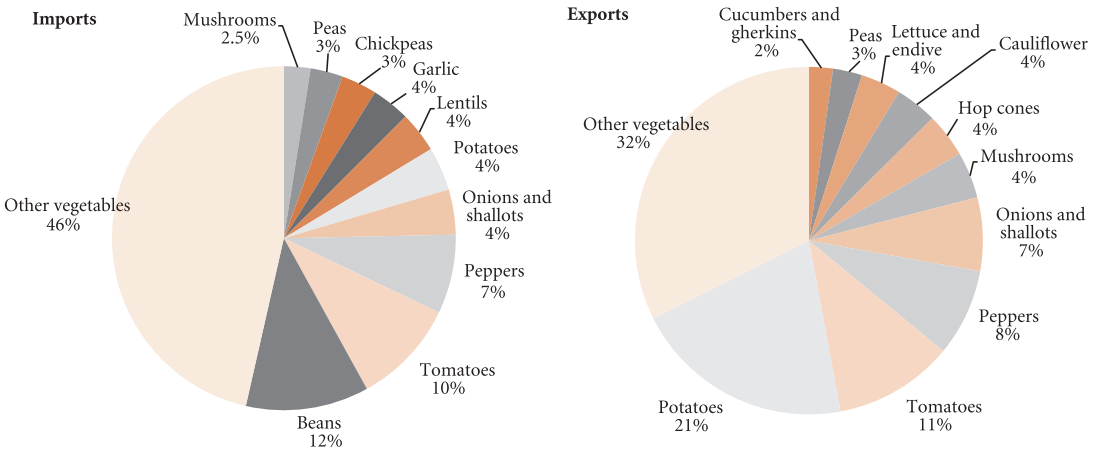
Figure 2 - EU-27-trade in fresh vegetables (in millions of euros)



Source: Eurostat, COMEXT data.

Figure 3 shows the percentage composition of imports and exports of fresh vegetables. The data presented are the average values recorded during the period 2011-2012. Tomatoes are the most imported fresh vegetables by the EU-27 (almost 10%). Significant values can also be observed for beans (11.5% of all imports) and sweet peppers (7%). However, the imports of potatoes (4%), onions and shallots (4%) have declined. In terms of exports, potatoes account for 20.5% of total exports of fresh vegetables. Lower, but still significant values are recorded for sweet peppers (8.12%, tomatoes (11%) and onions and shallots (6.8%).

Figure 3 - Composition of EU trade in fresh vegetables (2011-2012 average)

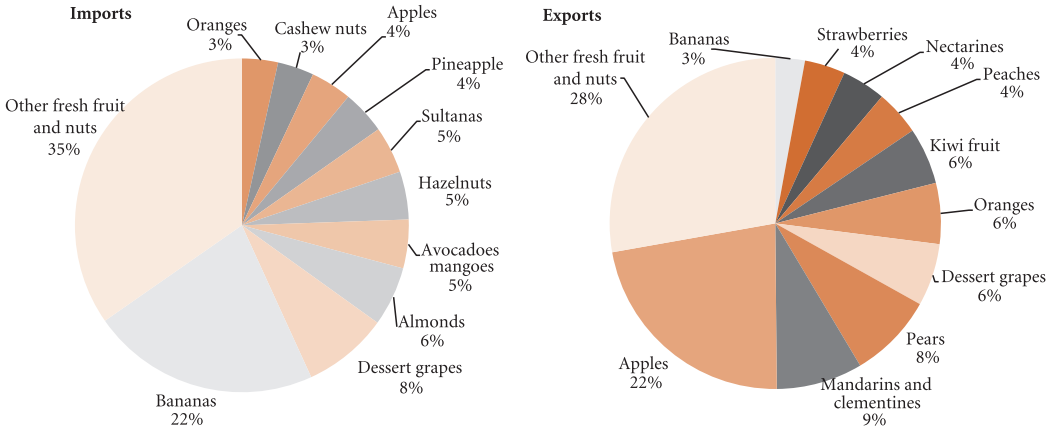


Source: Eurostat, COMEXT data.

Figure 4 illustrates the structure of imports and exports of fresh fruit and nuts. The main imported products include bananas (22% of imports) followed, with lower percentages, by table grapes (8.3%), almonds (5.7%), pineapples (4.2%, apples (4%) and oranges (3.4%).

The composition of exports is more fragmented: the largest category is that of apples (22.3%) followed by mandarins and clementines (8.4%), pears (8.3%) and kiwi fruit (5.5).

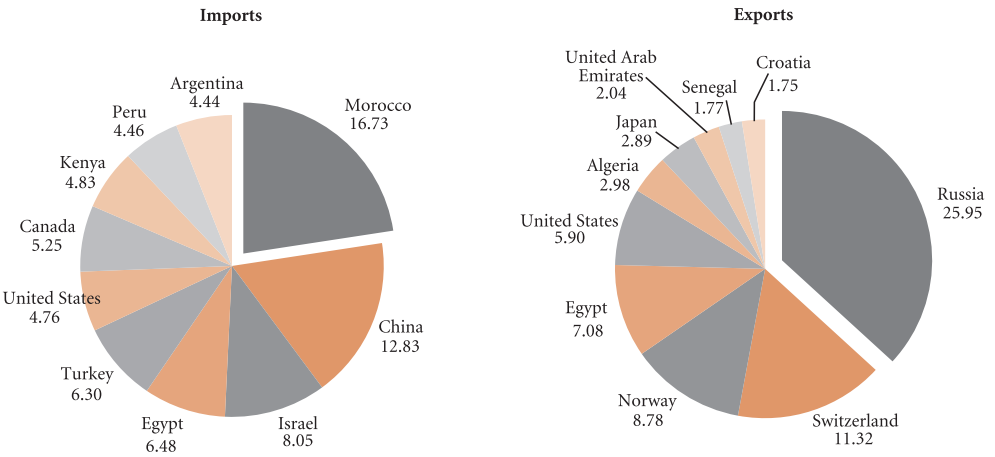
Figure 4 - Breakdown of EU trade in fresh fruit and nuts (2011-2012 average)



Source: Eurostat, COMEXT data.

Among the EU-27's trading partners, in Morocco, the main producing country of fresh vegetables, exports to the EU-27 increased by more than two and a half times (about 153%) from 2000 to 2012. China has become important in trade terms (by 119%), concentrating 12.8% of European imports. Imports from Israel (8%), Egypt (6.5%), Turkey (6%) and Canada (5.3%) are also significant, although still low. European exports of fresh vegetables are more fragmented. The main importing country was the Russian Federation, which absorbed 25.9% of exports, with an annual average growth rate of about 18%. Switzerland, the second recipient country outlet showed an annual average growth rate of 4.9% during the same period. These countries are followed by Norway (8.8%), Egypt (7%) and the United States (5.9%). Algeria, Japan, the United Arab Emirates, Senegal and Croatia, all have rates that are lower than 3%.

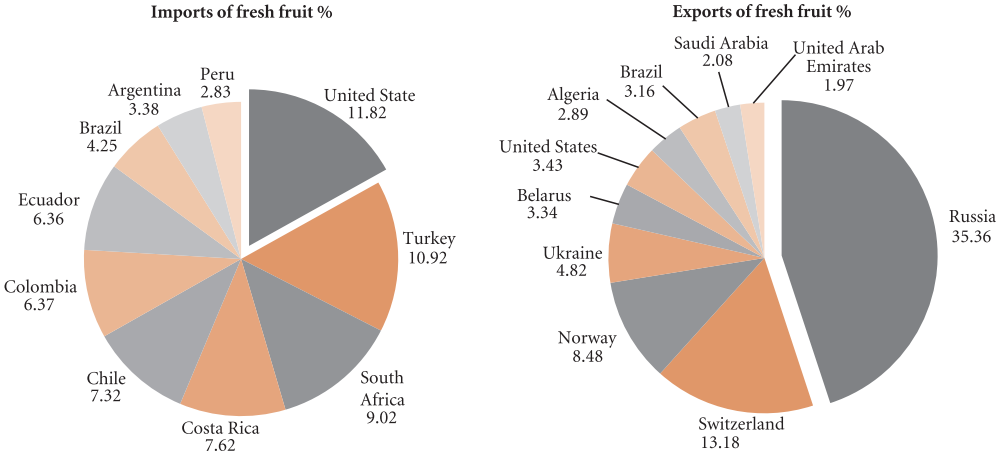
Figure 5 - The structure of trade in fresh vegetables by principal importing and exporting countries (2011-2012 average)



Source: Eurostat, COMEXT data.

In 2011-2012, the United States was the main exporting country of fresh fruit and nuts (11.8%), with an annual growth rate of 16.4% over the period. Imports come from Turkey (10.9%), followed by South Africa (9%), Costa Rica (7.6%), Chile (7.3%), Colombia (6.4%) and Ecuador (6.4%). Imports from Brazil and Argentina are lower. The principal market for European exports of fresh fruits is the Russian Federation, which accounts for 35.4% of total exports, with an annual growth of 16.4% from 2000 to 2012. The second largest market, Switzerland, with 13.2% of imports showed a relatively small annual growth (some 5%), followed by Norway (8.5% of total exports). Flows to all the other countries represented less than 5%.

Figure 6 - Structure of trade in fresh fruit and nuts by principal importing and exporting countries (2011-2012 average)



Source: Eurostat, COMEXT data.

Two strategic Mediterranean countries: Egypt and Morocco

The Mediterranean ranks among the leading areas for trade in fruit and vegetables. The twenty-two countries bordering the Mediterranean represent, in terms of value, some 23% of the global trade in fresh vegetables and 25% of trade in fresh fruit. It is interesting to focus on the two horticultural leading countries of the southern shore, namely Egypt and Morocco, to observe the dynamics of this trade

Exports of fresh fruit and vegetables from Egypt by importing country and by product

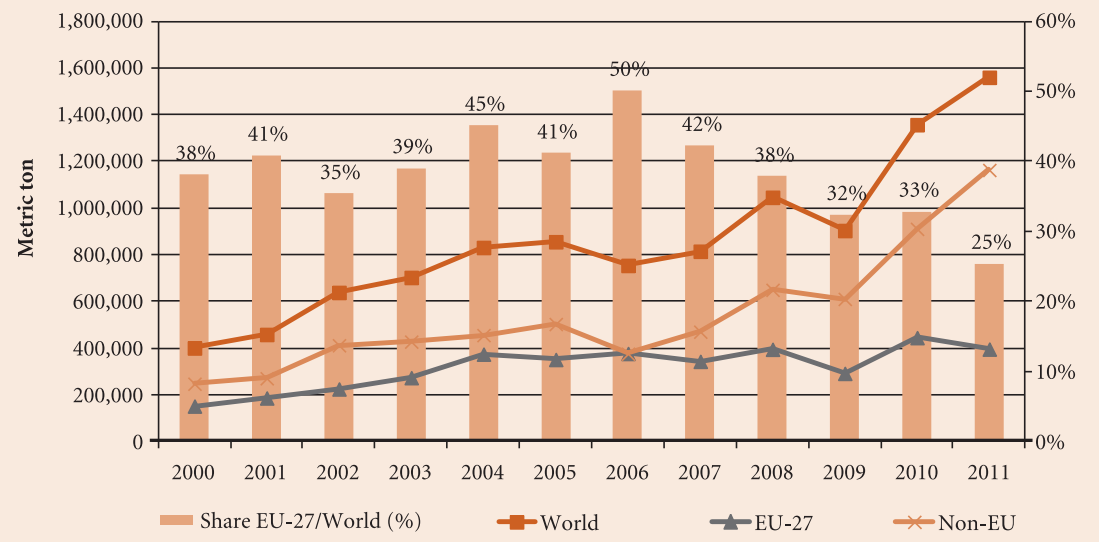
Egypt imported 1.25 million tonnes of fresh fruit and vegetables (a value of 728 million dollars) for 2010-2011 and exported 2.98 million tonnes (1.85 billion dollars). It recorded a trade balance of some 1.1 billion dollars. Compared to the previous decade, the country moved from a negative normalised trade balance[2], indicating a deficit in its trade with the rest of the world (– 0.21) to a positive normalised trade

2 - The normalised trade balance is the ratio between the trade balance (exports – imports) and the total value of trade (imports + exports) in percentage.

balance (+0.47). The evolution of exports of fresh fruit and vegetables shows a positive trend and is characterised by an annual average increase in value (AAGR of 26%), more than proportional to the annual average increase in volume (AAGR of 16%), thus showing Egypt's shift to higher added value exports.

The analysis of the destination markets for Egyptian fruit and vegetables shows that the EU-27 take a share of 31% of total Egyptian exports of fruit and vegetables in terms of value. However, while exports of fresh fruit to the EU have shown a significant rise, from 6.8% of total exports in 2000-2001 to 28.9% in 2010-2011, the trend for vegetables was reversed. Thus, the share of Egyptian exports to the EU-27 fell from 39.5% in 2000-2001 to 28.8% in 2010-2011.

Figure 7 - Evolution of exports of fresh vegetables by zone of destination

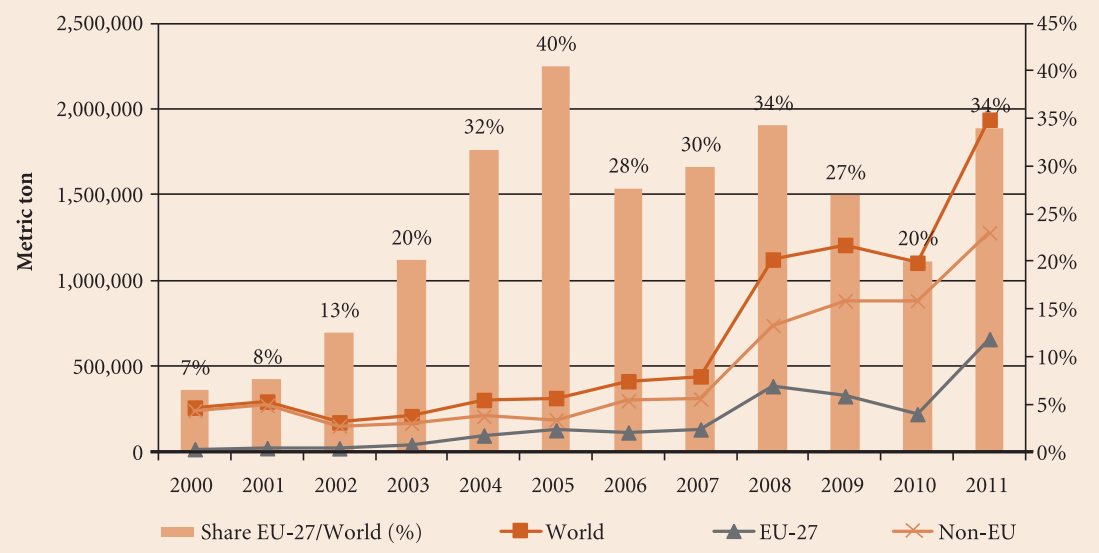


Source: UN-COMTRADE.

Among non-EU countries, Saudi Arabia was the top export market for fresh vegetables and fresh fruit in 2011-2012 (16.5% and 16.2% respectively by value), followed by the Russian Federation, with some 12% in volume and 9% in value. During the period considered, Saudi Arabia's share of Egyptian exports of fruit and vegetables decreased (by 25.3% in volume and 16.8% in value) with a reduction in the concentration of exports. Vegetable exports fell (11% in 2010-2011 against 18.2% in 2000-2001) while exports of fresh fruit increased, accounting for 2.4% of total Egyptian exports of fresh fruit and nuts in 2011-2012.

The diversification of export markets has accelerated, to the detriment of "traditional" destination markets. In Egypt, the first consequence of this was the increase in importance of certain markets (especially Russia, the Netherlands, Belgium and the United Kingdom). The Egyptian imports of vegetables have increased, but at a slower rate than the country's exports. Almost half of imports in 2010-2011 came from the EU-27 countries, in particular, the United Kingdom, France, the Netherlands and Denmark. The fresh fruit imported by Egypt during the same period was essentially Turkish, American, Lebanese, Sri Lankan and Syrian. The share of the EU-27, mainly France and Italy, slightly exceeded 7.5% of the total imports.

Figure 8 - Evolution of exports of fresh fruit by zone of destination



Source: UN-COMTRADE.

Box 1: The SPIIE Project

The SPIIE Project – the *Activation of Integrated Production Systems between Italy and Egypt* was carried out between 2010 and 2012, under the Framework Programme Agreement (FPA) in the Mediterranean, coordinated by Apulia region and the Mediterranean Agronomic Institute of Bari and implemented by ARC (Agricultural Research Center), HRI (Horticulture Research Center) and some Italian regional administrations.

The project aimed at facilitating the trade of fresh fruit and vegetable between Italy and Egypt in accordance with the objective of establishing a Euro-Mediterranean free trade area promoted by the Barcelona Declaration.

The project takes into account the constraints of the agro-food sector and in particular, the export of perishable products whose quality and commercial value must be guaranteed in order to access the European and international market. Export procedures were also conducted to simplify excessive bureaucracy, speed up customs clearance, and improve transparency and cooperation between cross-border public institutions and import-export enterprises.

A pilot Internet platform for the transmission of documents was implemented to enable the authorities of both countries to have on-line and real time documents related to the export of fresh potatoes. The pilot process (which now adds to those already valid and authorized by the EU) has been tested and adopted since 2011 to transmit the digital phytosanitary certification of potatoes from the port of Alexandria (with inspections made by the Plant Quarantine Service of the Ministry of Agriculture and Land Reclamation) and the port of Trieste (where inspections were carried out by the Phytosanitary Service of ERSA – Friuli Venezia Giulia). From February to April 2011, nearly 32,000 tonnes of potatoes were shipped via the two ports, 68 phytosanitary certificates were issued by the Egyptian authorities, 1,400 visual inspections were concudcted and 37 laboratory analyses were performed at the point of arrival in Italy. During the 2012 campaign, 55,000 tonnes of potatoes arrived at the port of Trieste accompanied by digital phytosanitary certificates while in the 2013 campaign, 54,600 tonnes of potatoes were shipped from Egypt to Trieste (partial data updated in mid-June).

The SPIIE Project has had positive impacts at institutional and economic level in both countries. The pilot process allows to accelerate the time of control at the border and customs clearance and therefore maintain the quality of products, to reduce the risk of error and falsification, to reduce the inefficiency costs and to promote dialogue between public institutions involved in trade. The project has sensitized and involved key public and private stakeholders on issues of trade facilitation in both countries.

The Egyptian experience could help streamline best practices in the trade of agro-food products in the Mediterranean. Jordan and Lebanon have identified the establishment of procedures for the electronic transmission of export documents as a priority for the development of agro-food trade. It is now necessary to strengthen inter-institutional co-operation among southern European states and Mediterranean Partner Countries (MPCs) to increase the competitiveness of the Mediterranean area, considering that in the past few years, agricultural exports from MPCs have been increasing while trade in Mediterranean countries has been decreasing.

Salama Eid Salem Sherif, Horticulture Research Institute (Egypt); Samir A. El-Gammal, Ministry of Trade and Industry (Egypt); Mara Semeraro, CIHEAM-MAI Bari.

Table 3 shows the breakdown of the basket of exported products by volume and its evolution from 2000 to 2011. In 2010-2011, the first three categories of exports (onions, oranges and potatoes) accounted for 63% of total exports of fruit and vegetables in volume, against 78.9% in 2001. This decrease in the relative weight of the first three categories occurred to the benefit of other categories such as strawberries, which grew annually by 50%, grapes by 63% and melons by 23%, highlighting both a diversification of the products supplied and the introduction of new categories in the basket of export products.

Exports of fresh fruit and vegetables from Morocco by country of destination and by product

Morocco imported 181,818 tonnes of fresh fruit and vegetables (for a value of 187 million dollars) in 2011-2012 and exported 1.47 million tonnes (for a value of 1.14 million dollars registering a trade balance of 1.14 million dollars and a positive normalised balance of 0.71. This value remained constant throughout the period 2000-2012. Overall, exports of fruit and vegetables showed a positive trend and were characterised by an increase in value (AAGR of 11%), greater than the increase in volume (AAGR of 5.3%), revealing a shift towards high added value products.

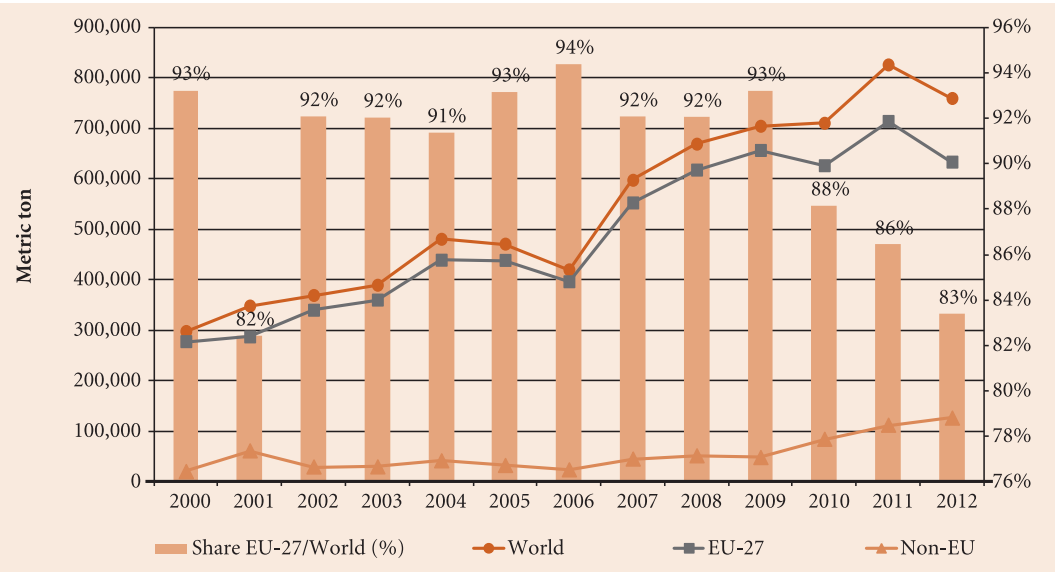
The analysis of the trade flows of fresh products reveals the major role played by the EU-27 countries in Moroccan exports of fresh vegetables. It is important to note that, during the studied period, the importance of the EU-27 as a destination market declined from 93% to 83% for fresh vegetable exports and from 64% to 44% for fresh fruit. Within the EU, Moroccan vegetable exports to France decreased from 65% in 2000-2001 to 54% in 2011-2012, while for fresh fruits the situation remained stable (around 29%). The Russian market, recorded an increase in Moroccan vegetable exports (from 1.7% in 2000-2001 to 29% in 2011-2012). Moroccan fruit and vegetable sales to Spain, the Netherlands and the United Kingdom increased while the sales of fruit to the Italian and German markets decreased but remained stable for vegetables.

Table 3 - Composition of Egyptian exports of fruit and vegetables

Products	Average 2010-2011 (Thousands of tons)	Importance 2010-2011 (%)	AAGR 2011-2000 (%)	EU share of total exports (%)
Onions and shallots	500.74	16.80	11.53	12.89
Potatoes	468.70	15.72	13.61	40.25
Dried beans	55.28	1.85	5.57	16.92
Fresh vegetables	47.74	1.60	19.95	64.41
Tomatoes	44.18	1.48	26.68	27.63
Arrow-root, Jerusalem artichokes, sweet potatoes	37.04	1.24	10.43	64.66
Broad beans and dried horse beans	16.49	0.55	– 4.76	16.33
Total Vegetables	***1,459.00***	***48.94***	***13.27***	***28.88***
Oranges	931.04	31.23	14.54	13.23
Grapes	353.60	11.86	63.12	77.80
Berries, Strawberries	49.81	1.67	50.59	48.52
Avocadoes, guava, mangoes	28.29	0.95	16.85	4.22
Melons and papaya	23.14	0.78	23.46	22.59
Dates	22.17	0.74	23.52	1.24
Mandarins	14.48	0.49	52.45	10.56
Grapefruit	14.23	0.48	72.24	4.90
Total Fruit	***1,521.94***	***51.06***	***20.07***	***28.92***
Total	**2,980.94**	**100.00**	**16.44**	**28.11**

AAGR = Average Annual Growth Rate
Source: UN-COMTRADE.

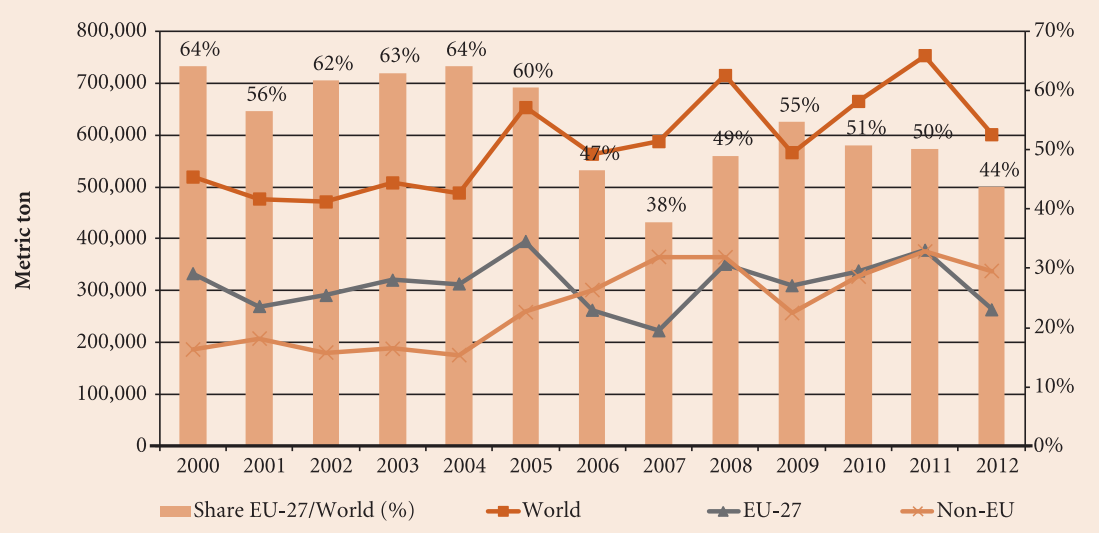
Figure 9 - Evolution of exports of fresh vegetables by zone of destination



Source: UN-COMTRADE

It is important to note that the presence of Moroccan fruit and vegetables, especially fresh fruit, is strengthening considerably in non-European markets. The main expanding destination markets include Russia, the United Arab Emirates, the United States and Canada.

Figure 10 - Evolution of exports of fresh fruit by zone of destination (in tonnes)



Source: UN-COMTRADE.

In Morocco and in Egypt, there is the same diversification of exports markets in relation to "traditional" destination markets, with an increase in the relative weight of the "new markets" (Russia, the Netherlands, Spain and the United Kingdom), especially for vegetables, to the detriment of traditional markets such as France, Italy and the United States. For fresh fruit, Morocco recorded an increase in exports to Russia, the United States and Sweden.

In 2000-2001, the majority of fruit and vegetables imported by Morocco came from Tunisia, Iran and France. In 2011-2012, import flows had radically changed, with a rise in the importance of Tunisia (over 40%), the United States, Egypt, Italy and Spain. France's share of the Moroccan market fell considerably.

Table 4 illustrates the composition of the basket of exported products by volume, and its evolution from 2001 to 2011-2012. The leading exported product, tomatoes, accounts for some 31% of exports of fruit and vegetables, followed by clementines and mandarins (26%) and oranges (11%). Onions, lemons and cucumbers experienced a considerable increase in exports, while a negative trend is noted for potatoes and oranges. The EU-27 is the principal destination market for fruit and vegetables from Morocco, with a particular prevalence of fresh vegetables (melons, grapes and potatoes).

The situation is similar in Egypt where the fall in the relative weight of certain categories in favour of others highlights a phenomenon of diversification of exported products with the introduction of new categories in the basket of products intended for the export market.

Table 4 - Moroccan exports to the world by product

Products	Average 2011-2012 (Thousands of tons)	Average 2011-2012 (%)	AAGR 2012-2000 (%)	EU share of total exports (%)
Tomatoes	454.7	30.9	8.5	85.5
Potatoes	20.3	1.4	– 8.5	79.8
Carrots, turnips, celery, etc.	9.3	0.6	4.4	44.9
Onions and shallots	6.1	0.4	31.9	32.8
Cucumbers and gherkins	4.9	0.3	25.6	55.8
Other vegetables	297.5	20.2	12.1	87.3
Total Vegetables	***792.9***	***53.9***	***8.1***	***85.0***
Mandarins, clementines, etc.	387.4	26.4	6.5	30.3
Oranges	164.5	11.2	– 6.5	58.0
Melons and papaya	55.7	3.8	10.3	96.4
Strawberries, raspberries, etc.	33.9	2.3	2.1	99.9
Lemons	18.8	1.3	51.5	27.2
Other fruit	16.9	1.2	6.8	89.0
Total fruit	***677.3***	***46.1***	***1.2***	***47.3***
Total	**1,470.2**	**100.0**	**4.3**	**67.6**

AAGR = Average Annual Growth Rate.
Source: UN-COMTRADE.

When logistics can make the difference

Even today, the fruit and vegetables sector still remains one of the most sensitive to logistics issues. The distance between the production and consumption sites, a determining factor in the production-marketing-distribution chain, the evolution of consumer demand, the internationalisation of markets and the dynamics of customer-supplier relations are among the main issues. An optimised and integrated management of the supply chain, trade capacity and logistics management, order handling, information and communication technologies (ICT) – bar codes, RFID (radio frequency identification) and online "track and trace" are all important factors that contribute to the development of the competitive advantage.

Logistics and fresh products

Efficient logistics management is the undisputed key to the management of "variable time", which is the main constraint to the economic success of production. In the field of fruit and vegetables, in particular, "time to market" must take account of "biological time" in agriculture and "logistical time" – delivery times, as well as quality control, packaging and time of conservation throughout the supply chain. That is the reason why the control and rationalisation of logistics now play a strategic role for all foodstuffs and especially perishable products.

Thanks to the development of logistics, the Mediterranean has regained a central position in global economic and commercial relations, not only in the field of transport but also in interconnection infrastructure (logistics platforms and hubs). Today, enterprises specialising in the marketing of fruit and vegetables have extended networks in most areas of production, while logistics firms manage distribution networks in a more efficient and structured way. This evolution has, of course, been supported and encouraged by the growth of modern distribution and the consolidation of the commercial model imposed by hypermarkets and supermarkets, centred on mass market supply and the differentiation or even the segmentation of the range of products, quality standards and logistical management of flows driven from downstream: quantity, quality, range, extended flows, delivery times, ICT (bar codes and RFID) are now the keywords of marketing. In this context, improvements in terms of efficiency and rationalisation of the supply chain can be envisaged. Among the critical factors of this evolution (cultivation methods, choice of varieties, conservation methods, especially those related to the cold chain, to name but a few), logistics, of which transport is the key component, is still the most complex element, often mobilising many different players, often located hundreds or even thousands of kilometres apart. Logistics is what weighs most heavily on the final cost of fruit and vegetables. Thus, compared with global growth in the sector, especially in America and Asia, the current slowdown in fruit and vegetable trade in the Mediterranean, which will continue in the near future, is mainly due to the slow development of an efficient logistics organisation not only in North Africa but also in Mediterranean Europe.

In the last thirty years, major distribution chains have globally set by the pace of logistics in the food sector, including perishable products. The major groups have focused on logistics to take off and go beyond the traditional fruit and vegetables trade by eliminating the actors and intermediaries that characterise it and by managing relations with producers directly. The principle of trade that is essentially based on the "major producer-major distributor" relationship is now dominant, even though this trade will soon probably reach its peak. One would soon expect the integration of different forms of organisation dominated by the specialisation of different players and different functions.

Box 2: Organic trade in the Mediterranean: the point of view of two experts from the southern shore

In the past years, trade flows of organic products between the countries of the southern shore of Mediterranean - where Egypt, Morocco and Tunisia are the main exporting nations - and the northern shore have increased. Vegetables and fresh fruits have experienced the highest growth; other important organic products for trade are: olive oil, dates, essential oils extracted from aromatic and medicinal herbs.

EU trade agreements with the Mediterranean countries make no distinction between conventional and organic products, both falling into the same quota and duty system (GATT system). The lack of any trade facilitation to access the EU market can be considered a barrier to the development of organic trade in the Mediterranean.

Moreover, certification requirements, by introducing the reference to the EC/NON EC origin in the new EC regulation, could disadvantage organic products coming from the south of the Mediterranean, as consumers may be biased against them and prefer EC products.

For the market development of Mediterranean organic products, some opportunities have been identified in association with the promotion of the Mediterranean Diet, recognised by UNESCO as Intangible Cultural Heritage. Another equally interesting development paths may link the promotion of organic farming to the rural development of marginal areas (i.e. mountain regions) and/or to origin-based products mostly coming from such areas.

The success of Mediterranean organic products could be fostered through the introduction of a unique Mediterranean brand recalling the nutritional value of the Mediterranean diet patterns, its cultural identity and linkages to smallholder and rural communities.

Hamid El Maloui, IPL/ASDA (United Kingdom); Iyed Kacem, Istituto Mediterraneao di Certificazione (IMC) (Tunisia).

The role of logistics platforms

Inspired by the example of the American giant Wal-Mart, major distributors have succeeded in re-launching the trade in fruit and vegetables thanks to a new and successful logistics organisation. They were the first actors in world trade to realise that there could be no development or expansion and economic success without creating logistics platforms, distributed across a vast territory according to their needs. Aware that a sales outlet could not individually manage its logistics without unmanageable costs that would seriously compromise their competitiveness in an increasingly complex market, they were able, at a critical stage of their evolution, to establish distribution centres with shortened storage times, able to serve several sales outlets. In Europe today, there are chains capable of serving a thousand sales outlets, situated up to 1,500 kilometres apart, thanks to the fourteen or fifteen established logistics platforms. For different sales outlets, the major distributors have established their own specific platforms that are gradually occupying a dominant position in the retail trade. They have deeply shaken the traditional wholesale trade, which was forced to adapt to the new logistics organisation. Using storage and distribution platforms for fresh products equipped with refrigerated chambers at different temperatures and capable of ensuring the continuity of the cold chain, large distributors have been able to negotiate, in a position of strength, their relationship with

producers of fruit and vegetables. It is no coincidence that in the vast majority of cases, buyers of fruit and vegetable working for major distributors have established their sales offices within these platforms. This organisation has allowed them to achieve the highest level of efficiency in terms of overall management.

The example of the introduction of the Auchan Group, the second largest French distributor and among the top global distributors, into the Hungarian market describes the process of expansion of supermarket chains in practice. In a few years time, the Group planned to open an optimal number of sales outlets manageable from a single platform based in Budapest where logistics activities, operations and management would be concentrated. All fruit and vegetable suppliers from any region of the world, who wish to penetrate the Hungarian market through the Auchan outlets pass through the central purchasing platform in Budapest and meet the specifications established by the chain its suppliers. Budapest buyers have analysed in detail the types of products and the characteristics that they must have (quality, form, taste, colour) to succeed in the Hungarian market. From their suppliers, they require quality certification and control, compliance with standards over time and appropriate quantities. With those that pass the trial period, supply programmes are elaborated at stable or variable prices, according to a predetermined range. Whenever the goods are delivered to the platform, they are stored for the shortest possible time, and then assembled into customised groups to meet the specific requirements of one or more sales outlets. Many of these sales outlets are supplied daily.

This process is almost the same for all major distribution establishments worldwide. It has generated several effects, sometimes large effects, on production and the global trade in fruit and vegetables. Some major producers have specialised in direct supply of large chains, adhering to a harvesting schedule established with them. Small and medium producers have joined forces and concentrated their output in order to be able to supply major distributors and avoid being "excluded" from what, in a quarter of a century, has become the global trade model for fruit and vegetables. Many others went into crisis or identified alternative channels to remain on the market. Their economic survival still depends mainly on the high specialisation of production, in the hope of successfully conquering the famous niche markets. In this context, where major distributors encourage the development of logistics through the creation of platforms, what are the major challenges for the production and the organisation of the traditional market?

The most competitive Mediterranean fruit and vegetable producing countries have learnt the consequences of this new situation. They must become partners of the major European and global distributors, steering their activities and production in this direction, or innovate by creating and organising their own logistics platforms to be able to supply large buyers in the shortest time possible. The successful supply of fruit and vegetables depends on three interrelated factors: the availability of the product, which satisfies the needs in terms of quality and quantity, price and delivery time.

Having one's own platform in a major market is a tremendous competitive advantage for a supplier of fruit and vegetables or perishable products, whose shelf-life is, to

varying degrees, limited (one or two weeks) or very short (a few days). Thanks to this logistics base, the supplier can not only store the product in accordance with the conditions necessary for its optimal conservation, and deliver it rapidly upon the request of the final distributor, but can also package the product according to each customer's requirements. Nevertheless, it is well understood that on-site packing prior to long-distance transport is an additional advantage for product quality, giving it an added value compared with a product delivered in bulk and packaged by the distributor on the platform.

Obivously, the number of Mediterranean producers and exporters able to establish their platforms at or near markets with large market opportunities remains limited. However, other solutions, which have emerged after the establishment of the first logistics platforms of supermarket chains, can help. One of these solutions is the creation of large equipped complexes to provide fresh products, which can be used for individual activities or provide specialised logistics skills and services at competitive prices. The most significant example in Europe is probably that of Saint-Charles International, situated near Perpignan in the South of France. Other major logistics sites are currently being developed in Russia, in Saint Petersburg and Moscow, to serve a very vibrant market, as Russia is one of the largest markets in the world in terms of export and distribution of fruit and vegetables.

Box 3: The Saint-Charles International multimodal platform

The Saint-Charles International or Pyrénées-Méditerranée (MP2) multimodal platform, situated near Perpignan in Languedoc-Roussillon, is a logistics hub covering some 33 hectares, specialising in the import/export of fruit and vegetables. It is the leading economic pole in the Department, bringing together maritime, road, rail and air transport routes. It is part of the network of southern French ports including Port Vendres, the second fruit port in the Mediterranean, with an area of refrigerated warehouses covering 18,000 m^2. The Perpignan Saint-Charles rail terminal allows the movement of goods to European and especially domestic markets, while the Perpignan-Rivesaltes international airport is used for long-distance shipments. The MP2 platform project was born in the 1960s, thanks to a public-private partnership between the Pyrénées Orientales Chamber of Commerce and Industry and fruit and vegetable importers who joined forces in the ERZAE Company, which led to the establishment of the Saint-Charles Economic Activity Zone in 1968.

Since 1971, industry professionals have settled at the Saint-Charles International Market (MISC). The annual volume of trade increased from 104,000 tonnes in 1971 to 1.5 million tonnes in 2009, of which 949,830 tonnes were destined to the EU (913,898 tonnes to Spain) and 550,070 tonnes to non-EU countries (including 532,279 tonnes to Morocco). Continuous expansion have made it possible to increase the combined traffic of the platform seven-fold. Finally, 35% of the trade volume, i.e. some 525,000 tonnes, is exported.

Saint-Charles International is one of ten platforms of European interest, and one of three distribution centres for fruit and vegetables in the EU, the others being in Munich and Milan. It comprises 300,000 m^2 of air-conditioned warehouses, concentrates 65% of regional logistics, 92% of conventional rail transport of fruit and vegetables and has an uninterrupted daily flow of 2,500 heavy goods vehicles and 20,000 light vehicles. A 150,000 m^2 site managed by the *Conseil Général* of Pyrénées Orientales hosts several hundred businesses. Finally, the platform's activities generate

an annual turnover of 1.6 billion euros, while between 5,000 and 10,000 tonnes of fruit and vegetables are handled on the site every day. Winner of the best European platform prize in terms of environmental quality and innovation in 2010, the following year Saint-Charles International inaugurated a solar-photovoltaic power station. This is the largest installation integrated in a building in the world, with 97,000 solar panels producing about 11 gWh.

Céline Huber, Consultant (France).

The success of Spain, a major power in the fruit and vegetables trade, has been made possible thanks to the ability of some national operators to create logistics hubs in Europe. An infrastructure policy supporting the production and export economy allowed the country to become one of the top fruit and vegetable producers and exporters in Europe's. The Spanish cooperative movement has succeeded in concentrating supply to substantially reduce costs, increase available quantities and become an ideal partner for European major retailers. Anecoop, the leading fruit and vegetables producer in Spain, based in Valencia, was the first to create platforms abroad to supply its major customers and ensure its development. Its first logistics platform outside the national borders was established in the Saint-Charles International complex. From there, Anecoop supplies French and some European distributors. Many European customers, Italian in particular, also source their supplies in Perpignan, thus avoiding hundreds of kilometres of additional road transport to reach the warehouses in Valencia. Other Spanish companies followed the Anecoop example. The Saint-Charles International multimodal platform has also become the main European logistics hub for Moroccan exports, as several Moroccan or Franco-Moroccan companies have opened branches and installed warehouses at this site.

Spain has overtaken Italy in terms of exports but also in the production of fruit and vegetables. Italy has fallen behind primarily due to the weak development of a logistics network in Europe. However, in the last three years, one innovation could, at least in part, satisfy the needs of Apulia's exporters: the transformation of wholesale markets in Italy and abroad into fully equipped logistics sites or even real logistics platforms for the fruit and vegetables trade as a whole (operators within each market, commercial operators abroad including foreign operators, major retail chains for operations and products which they could not manage within their own platforms). Interesting examples include the Mercabarna, a wholesale market in Barcelona which seeks to develop new logistics import/export services; the Verona wholesale market which, in 2013, opened a logistics platform in the Hamburg market to facilitate the export flows of its 70 wholesalers, after building the *Veronamercato Network* for these operators; the Padua market, which has opened a logistics platform in the Balkans; the Genoa market, in which the possibility of creating and managing a logistics platform for Tunisian fruit and vegetables destined for Italy and Europe is being evaluated.

This evolution of European wholesale markets could be an interesting model for rural areas in the Mediterranean region. In these new generation market-platforms, small and medium-sized producers could find commercial services, information,

training and especially logistics, allowing them to ensure the delivery of their products to the destination markets by concentrating the supply. Meanwhile, a new development strategy could be elaborated for marginal rural areas, specialised in the production of typically Mediterranean fruit and vegetables.

Logistics in the Mediterranean is a crucial issue that has many facets. Its development involves the improvement of maritime logistics, port and inner harbour services, intermodal transport and the renewal of the transport of fresh products by rail. The use of airfreight for high added value products needs to be revisited, following the model of Egypt, which has a cold warehouse at Cairo international airport. In 2011, at global level, 2.5 million tonnes of perishable products were carried by air and 91 million tonnes by sea. It is worth noting that in Dakar, in 2013, an operator of global importance will open a terminal for the air transport of perishable goods, essentially fruit and vegetables. Likewise, in Brussels, a facility will be built to receive, store and distribute by air these types of products coming from Africa and South America and destined for the European market.

Box 4: The logistical challenges of the fruit and vegetables industry in Morocco

The study of logistics chains of citrus fruits and early vegetables (the two pillars of the fruit and vegetables sector) highlights the logistical problems in a domain where food safety requirements, logistics performance and environmental protection are essential to product quality (perishable products). Any break in the cold chain automatically causes the loss of the entire shipment. The cold chain plays a dual strategic role in the reliability of the "production-marketing" process of fruit and vegetables. It ensures the preservation of the quality of products between harvesting and marketing, and also their long-term conservation (from 4 to 8 weeks).

An efficient cold chain enables the regulation of supply and demand (by adapting market quantities to harvest periods). The shortcomings in this field have forced the leading fruit and vegetable exporters, who account for 95% of the country's citrus exports, to adapt their logistics models, and use different modes of transport in order to optimise performance and logistics costs. The Maroc Fruit Board (MFB) thus sends 45% of its exports by conventional "reefer" ships, 40% by refrigerated containers and 15% by refrigerated trucks, from the three main Moroccan sites (Casablanca, Agadir and Nador).

Despite all efforts, the Moroccan fruit and vegetables industry suffers from many limitations particularly related to the problems of transporting products from production sites to consumption sites, the large number of intermediaries in the chain and their lack of coordination, as well as a very tight schedule during the production period.

The main bottlenecks in the fruit and vegetable chain are due to a number of problems:

- The particularly long journey time between Morocco and Europe (ten days by maritime containers between Casablanca and Le Havre, seven days between Agadir and Rotterdam, against six to seven days by truck to the same destination);
- The very high cost of maritime transport to Morocco compared with other destinations;

- Insufficient container ship services dedicated to the cold chain from the town of Agadir (considered as the most important outward hub for fruit and vegetables from Morocco), due to the inadequate programming of charter volumes, despite the efforts of some ship-owners (IMTC, Maersk, CMA-CGM, etc.) ;
- A relative lack of cold infrastructure, specialised storage and safety (slowness of operations and deterioration of products).

These constraints related to means of transport and logistics plus other organisational barriers, related to the large number of intermediaries in the chain and their lack of coordination (producers-exporters, packaging stations, bundling, commission agents and importers in the destination markets, service providers, port passages, etc.).

Although for early vegetables, especially those from the Agadir region, road transport is more advantageous than maritime transport, it also suffers from problems, which make it less competitive than road transport in competing countries (Spain, Turkey, etc.). Refrigerated road transport is costly for Moroccan exporters, since it accounts for 15 to 30% of the value of the goods (this cost is twice as high as that of Turkish exports and three times as high as that of Spanish exports).

The cost of road transport within Morocco, especially between Tangiers and Algeciras, is very expensive compared with other transport sectors in Europe (a quarter of the total cost for less than 1% of the journey to the major European markets). The real cost within Morocco's borders is generally higher than the cost of transport in Europe. Railways and air transport only slightly offset the disadvantages of maritime and road transport of fruit and vegetables. Indeed, the major Moroccan fruit and vegetable producing regions (Agadir, Berkane) are not accessible by rail. Air transport of fruit and vegetables is little used. It is reserved for certain early vegetables and perishable foods (fish, mint, flowers) and only concerns small specific deliveries (the high cost and limited flights to some customer markets discourage the use of this mode of transport).

The competitiveness of the Moroccan fruit and vegetables chain requires a global logistical vision and the introduction of a supply chain strategy adapted to the sector's competitive environment. Several projects (sea motorway for fruit and vegetables, logistics platforms, categorisation of intermediaries through customs, etc.) are in progress, supported by international institutions (World Bank, EU, etc.) and developed by experts in collaboration with Moroccan operators and institutions. The need for organisation is urgent and investment in the cold chain is essential. Close collaboration between all those involved in the chain, from upstream to final distribution, is necessary to establish a new culture of transparency and collaboration.

Mustapha El Khayat, Moroccan Association for Logistics (Morocco).

Conclusion

In commercial terms, exports of fruit and vegetables from Mediterranean countries such as Egypt, Morocco or Turkey have been on the increase since the beginning of the twenty-first century. However, it is necessary to realise that these trade flows have been diversified. New opportunities have emerged for citrus fruits and Mediterranean vegetables. In this respect, Russia is a perfect example of a new strategic destination. In order to establsih these trade routes that are less obvious in geographical and cultural terms, the Mediterranean countries have managed to improve their logistics systems. Followed by Morocco, Spain has not failed to take up the challenge of logistics. They have both managed to perfectly adapt their productive

potential to the modern requirements of export. This effort requires not only economic and political investment but also time. Indeed, new technologies constantly offer additional opportunities to optimise the commercial chain and logistics management. Transportation and distribution of fruit and vegetables are essential criteria for sustainable competitiveness. In this context, the role of platforms is crucial. It would be a mistake to ignore them, avoid them or demonise them just at a time when they have acquired such an important dimension in the trade in fresh products.

While several Mediterranean countries are already developing platforms, synergies between them should be strengthened. The fluidity of trade flows in fruit and vegetables through logistics and the maritime transport system has a major role to play in the competitive international market. The Mediterranean, with its large number of ports and countries offering intra-Mediterranean and intercontinental links, is a natural bridge for the marshalling of goods from the southern Mediterranean, and also from Asia, destined for northern and eastern European markets.

An efficient port system, with appropriate infrastructure, would strengthen trade relations and the synergies between the two Mediterranean shores. There is also the question of diversification of the "product portfolio". Despite a concentration of the range in certain "traditional" categories (potatoes for vegetables, oranges for fruit), there is a trend towards diversification, especially towards products with a higher added value. This indicates an increase in the competitiveness of Mediterranean products, related not only to the orientation of southern Mediterranean countries towards exports of products with a higher added value in international markets, but also the development of a more efficient transport system and logistics chain management.

Ideally, the logistics of fruit and vegetables in the Mediterranean should be reorganised through agreements and integration of structures, services and trade actors, in order to strengthen the distribution of these Mediterranean products globally. Transaction costs due to goods disputed and rejected by destination markets, the complexity of trade procedures, quality control of products and loss of time in the different commercial operations undermine the competitive advantage characteristics of products from the southern Mediterranean and the positive effects of Euro-Mediterranean partnership agreements. Greater transparency in markets and more reliable trade relations, with equipped spaces in logistics hubs should lead to lower costs. Launching or strengthening interregional organisational initiatives for production and marketing in the fruit and vegetables industry, especially encouraging close collaboration between those who require logistics services and those who need them would be very useful. It would improve the production process and achieve economies of scope and scale highlighting the specific features of different territories and conquer new markets. Companies need to combine products from different regions into a single package, sharing common rules for production and marketing. This would establish a common path, based on the transfer of technologies and skills and the support of an effective logistics system to achieve goals that have an impact on the domestic and international economy of the Mediterranean region.

The analysis presented here clearly shows the necessity to develop collaborative strategies throughout the distribution chain, taking into account the logistics platforms,

relations with modern distribution and transport management from a multimodal perspective. It is therefore imperative to encourage strong partnerships to ensure the provision of logistics services of the highest possible quality (door-to-door service management, use of refrigerated ships, control of the cold chain, standardisation of service, etc.) and to respond effectively to the requirements of end customers and consumers.

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CHAPTER 10

SEAFOOD IN MEDITERRANEAN COUNTRIES

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Seafood can be defined as freshwater and marine animals, excluding mammals, which are regarded as food by humans[1]. It mainly includes fish and shellfish (crustaceans and molluscs) and is an important source of protein in many diets around the world, traditionally in coastal areas. Seafood may also include seaweeds. However their consumption is still very low in Mediterranean countries. Harvesting, processing and consumption of seafood are ancient practices that date back to at least the beginning of the Palaeolithic period, where people lived a hunter-gatherer lifestyle. There are records of regular consumption of freshwater fish in China (Tianyuan man) about 40,000 years ago. The fishing scenes of ancient Egypt found in tombs, drawings and papyrus, as well as those represented in Roman mosaics (e.g. Bardo museum) are evidences of the importance that fishing and seafood had in those societies.

Nowadays, after cereals, fish and fishery products represent one of the most valuable sources of protein and essential micronutrients for a balanced nutrition and good health. They also help produce fatty acids that are necessary for proper physiological development (especially brain and heart). The total availability and therefore the seafood consumption per capita grew at an annual rate of 3.2% over the 1961-2009 period from about 9 kg per year in the early 1960s to 18.4 kg in 2009. In 2009, fish accounted for 16.6% of the world population's intake of animal protein and 6.5% of all protein consumed (FAO, 2013a).

The world's growing demand for seafood has been met with equivalent increases in fishery production, mainly from marine capture fisheries over the 1950s-1970's

1 - The countries included in this study are: Albania, Algeria, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Macedonia TFYR, Montenegro, Morocco, Palestine, Portugal, Serbia, Slovenia, Spain, Syria, Tunisia, Turkey. They are divided into 3 groups: 1) EUMC: European Union Mediterranean Countries (Cyprus, France, Greece, Italy, Malta, Portugal, Slovenia, Spain); 2) NAMC: North African Mediterranean Countries (Algeria, Egypt, Libya, Morocco and Tunisia); and 3) OMC: Other remaining Mediterranean Countries (Albania, Croatia, Israel, Lebanon, Palestine, Macedonia TFYR, Montenegro, Serbia, Syria and Turkey).

period, and from aquaculture during recent decades. In 2010, capture fisheries and aquaculture supplied the world with about 148 million tonnes of fish, nearly 86% of which was used for human consumption. The rest is used for other purposes mainly fishmeal and fish oil. Like other agro-food products, fish and fishery products must go through the distribution channels in order to reach the end-user or consumer. What differentiates these products is their very high heterogeneity (different production origins and ecosystems, diversity of animal groups and products).

Seafood remains among the most traded food commodities worldwide, accounting for about 10% of total agricultural exports and 1% of world trade by value. Sustained demand, trade liberalisation policies, globalisation of food systems and technological and transportation innovations have furthered the overall increase in the international fish trade, reaching an estimated value of 129 billion dollars (export value) in 2012. However, it is important to note that due to the high perishability of fish, processed products are the most traded commodities.

Seafood demand and supply

As mentioned above not all fishery production is used for human consumption. In fact, figures for 2012 show that 86% of production (134.6 million tonnes) was used for human consumption. In the case of the Mediterranean it reached a high level (91.1%) in 2007. Only in a few countries such as Morocco and Turkey, the contribution to non-food uses (mainly fish meal and fish oil) reached significant volumes and proportions, 21% and 23% respectively (see Table 1). It should be noted that most Mediterranean countries are net importers of seafood. In fact, about 44% of the supply is composed of net imports (in live weight tonnes[2]). In 2007, only two countries (Morocco and Turkey) showed a positive balance in terms of volume.

Seafood demand

The total demand of fish and fishery products in the studied area (supply) was estimated at almost 10 million tonnes in 2007. The two most important markets are France and Spain, with about 2 million tonnes, followed by Italy and Egypt with 1.5 and 1.3 million tonnes, respectively. Other important markets include Portugal with 650,000 tonnes, Turkey with almost 600,000 tonnes, Morocco with 350,000 tonnes, Greece with 230,000 tonnes and Algeria and Israel with about 170,000 tonnes.

With 39% of the Mediterranean population, the EU Mediterranean countries (mainly, France, Italy and Spain) accounted for 68% of the demand in 2007. An increase in the seafood markets in most countries of the Mediterranean has been observed since the 1970s. This increase is more significant in North African and other countries where important social and demographic developments are leading to a reduction in the existing per capita consumption gap with respect to European countries.

2 - Just as the supply balances for meat products are calculated in "carcass equivalents", the supply balances for fish and fishery products are calculated in "live weight equivalents". Therefore, conversion coefficients are used in order to convert the weights of all products traded into live weight equivalents, whether they are preserved products, fresh fillets, deep-frozen fillets or in other processed forms, or whether they come from capture fisheries or aquaculture.

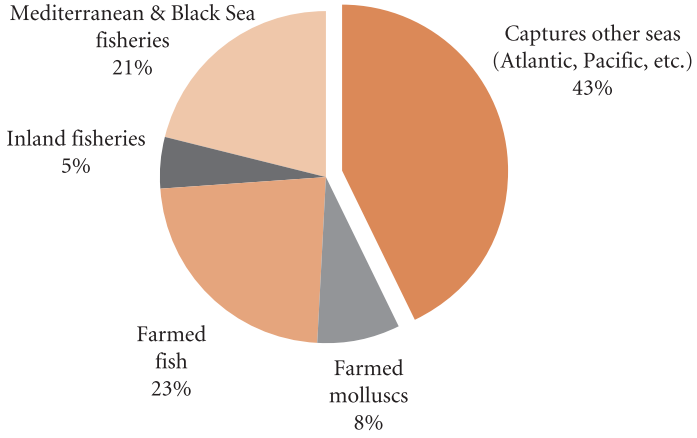
Seafood supply

The demand for seafood in the Mediterranean is supplied by domestic production (56%) of fishery products (both from aquaculture and capture fisheries) as well as by growing volumes of imports (44%). Since the mid 1990s, aquaculture has been the driving force behind the growth in total fish production as global capture production has levelled off at around 90 million tonnes. Its contribution to the total fish production worldwide has doubled in the past fifteen years and reached 40.3% in 2010 (FAO, 2013a). In a few years, aquaculture will overtake capture fisheries in its contribution to seafood for direct human consumption. This will lead to significant changes within the sector and will have an impact on prices, product development, packaging and distribution. Over time, consumption will also be altered, as the seasonality of supply will probably be reduced compared to today's situation. Many representatives of the traditional capture fisheries sector will undoubtedly consider this new scenario with some hesitation. The future will however also present new opportunities, especially in marketing, since the sector will now have a more exclusive product with unique characteristics that could be communicated to consumers.

The proportion of aquaculture products in the Mediterranean seafood supply is difficult to estimate, as trade statistics do not distinguish between capture fisheries and aquaculture. It is however known that among the most traded fish and fishery commodities, there are increasing amounts of aquaculture products, such as farmed salmon from Norway and Chile, frozen fillets of pangasius, tilapia and other freshwater fish from Asia, Africa or Latin America, or farmed tropical prawns (frozen) from Asia and South America (Paquotte and Lem, 2008).

Figure 1 and Table 2 show the total fish production (capture and aquaculture) of Mediterranean countries and the various origins of national production, such as capture fisheries from different seas and environments (Mediterranean, other seas and inland waters), as well as aquaculture production in fresh or marine waters, which is also based on very different production systems. Although most of the fish production from Mediterranean countries comes from capture fisheries (69%), it should be noted that 43% are from captures outside the Mediterranean Sea (Atlantic and other seas). In 2010 captures from the Mediterranean accounted for only 21% of the total fishery production, i.e. less production than aquaculture (31%). Over the past two decades the trend has remained more or less stable, due to a growing aquaculture sector that has compensated for the decrease in capture productions. Drops in catches experienced by EU Mediterranean countries, as a result of the limitations imposed by the EU on harvest, have been partially compensated by North African countries, especially Morocco (Franquesa *et al.*, 2008).

Figure 1 - Fishery production sources (capture and aquaculture) in Mediterranean countries



Source: FAO.

There are about 170,000 fishing vessels in the Mediterranean countries, operating in the Mediterranean Sea as well as in other seas (Atlantic, Black Sea, Red Sea) (Franquesa *et al.*, 2008). European countries account for around a third of the vessels, but these are larger in size, tonnage and power. The same applies to the distribution of fishing harbours and landing sites as well as the number of fishermen, which does not reflect the real potential of the fishery sector. Thus, Mediterranean fisheries operate in small harbours and are highly artisanal, labour intensive and based on a wide variety of target species of high commercial value, whereas coastal and offshore Atlantic fisheries (France, Morocco, Portugal and Spain) operate with more powerful boats, landing their catches in bigger harbours with better infrastructure and a strong associated industry. This is the case of the Vigo fishing harbour, the most important in Spain in terms of landings. It is the base for the main factory ships of the Spanish fleet, hosting several fish markets and auctions (auctions of offshore fisheries, big fish [tunas, sword fish, etc.], coastal fisheries [several days], artisanal fisheries [catch of the day], shellfish and an interactive/digital) as well as important seafood processing plants and distribution companies.

As regards the aquaculture sector, there is a semi-intensive production of large volumes of molluscs (clams, oysters and mussels) in France, Italy and Spain, a semi-intensive production of tilapia, mullet and carp in Egypt and an intensive production of high value carnivorous finfish species (sea bass, sea bream, trout, turbot, meagre, eels, tuna, etc.) in various countries (Greece, Turkey, Spain, Italy, Israel, etc.). This illustrates the very different ways through which fishery products enter the distribution channels: imports of white fish fillets (by air), frozen seafood (whole frozen, fillets, loins, surimi, etc. processed on factory ships and landed in harbours or imported by land or air), fresh fish landed in large and small fishing ports as well as in other landing sites, harvested bivalve molluscs transported to purification plants before entering the distribution channels, aquaculture fish harvested in farms and then sold or packaged and/or pre-processed in company units. Table 3 presents a summary of the main sources for seafood products in Spain. This strong

heterogeneity of the origin of seafood products (such as hake) or of the raw materials used for processing (such as tuna) is used as a strategy to ensure a stable supply, both for volumes and prices. The case of clams, salmon and shrimps, produced on a large scale by both capture fisheries and aquaculture can be highlighted as well as the case of calamari, hake, tuna and shrimp, a generic name for various species with different geographical origins.

Seafood consumption

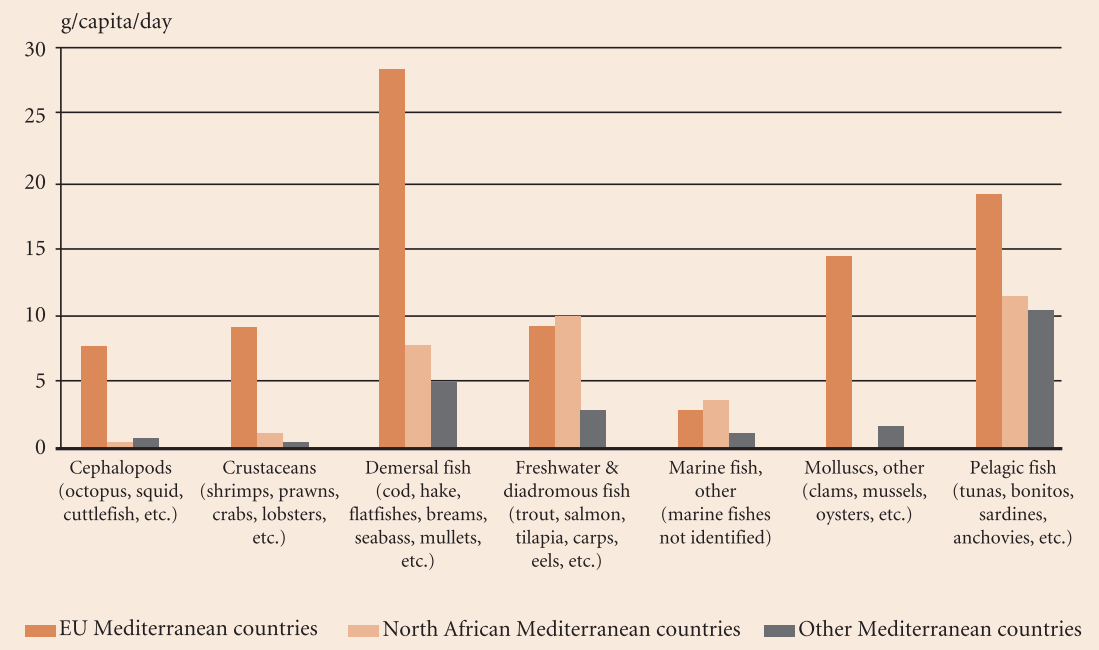
The trend observed since the 1970s is a general increase in the per capita supply of fishery products in most countries of the Mediterranean area (Franquesa *et al.*, 2008). Thus, during the past decade, seafood consumption has increased by about 8% for the whole region. The average seafood supply per capita in the region reached almost 20 kg in 2009, although with high variations from country to country. In fact, in EU Mediterranean countries, the per capita supply was almost three times higher (33.4 kg) than in North Africa (12.5 kg) and nearly four times higher when compared with other Mediterranean countries (8 kg). With more than 60 kg per capita Portugal is the top supplier, followed by Spain with more than 40 kg, whereas Palestine, Syria and Montenegro have less than 5 kg per capita.

The reasons behind these differences in consumption are diverse, and are related not only to cultural and gastronomic habits, demography and standards of living, but also to general logistics issues, such as deficiencies in road communications and lack of wholesale food markets. For example, in some non-European countries with important fishery sectors, such as Morocco, Tunisia or Turkey, consumption still varies notably between coastal and inland regions.

Compared to other agricultural products, the consumption of seafood is based on a number of different marketed species (cephalopods, crustaceans, bivalves, demersal fish, pelagic fish, etc.) and their derived products (fresh, frozen, canned, cured, etc.). In all countries, the highest consumption is observed within the groups of pelagic fish (tunas, bonitos, sardines, anchovies, etc.) and demersal fish (cod, hake, flatfish, sea bream and sea bass, etc.) (Figure 2).

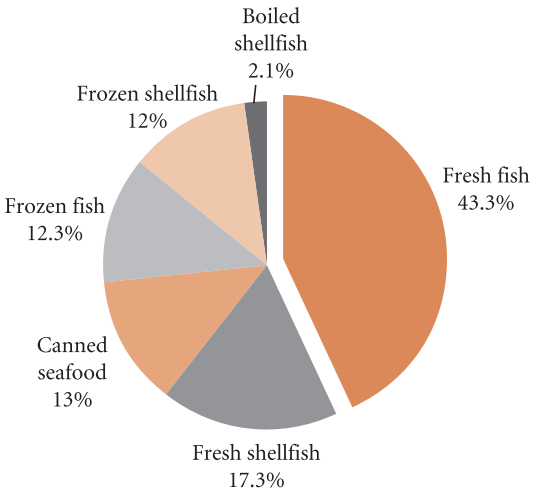
Unfortunately, FAO statistics provide information on consumption by groups of species, which although showing a good part of the "picture", do not inform on seafood products as a combination of a given species with a particular presentation (e.g. fresh, frozen, canned, cured, etc.). It is for this reason that some countries are conducting consumption surveys that take these elements into account. Thus, the survey on food consumption conducted in Spain in 2006 (Figure 3) with data on seafood consumption (at home and away from home) reported almost 50 products with fresh fish as the main consumed product with 43.3%, followed by fresh shellfish (mollusc and crustaceans), canned seafood, frozen fish, frozen shellfish and boiled shellfish (MAGRAMA, 2007).

Figure 2 - Estimated seafood supply in Mediterranean countries (year 2009)



Source: FAO, Faostat, Food Balance Sheets.

Figure 3 - Seafood consumption (at home and away from home) in Spain (2006) by type of product



Source: MAGRAMA (2007).

Seafood trade

According to FAO estimates, fish and fishery products remain among the most traded food commodities worldwide, accounting for about 10% of total agricultural exports and 1% of world merchandise trade by value (FAO, 2013a). Sustained

demand, trade liberalisation policies, globalisation of food systems and technological innovations have furthered the overall increase in international fish trade, reaching an estimated value of 129 billion dollars (export value) in 2012.

Imports of fish and fishery products for all Mediterranean countries amounted to 5.2 million tonnes in 2009, about 15% of total world imports (33.7 million tonnes). Over the period 1999-2009, imports in the Mediterranean have increased by 24% on average, significantly less than the 39% increase observed in the world. The three major importing countries of the region are Spain, France and Italy, which account for more than 70% of all imports of fish and fishery products in the region (Table 4). In Spain and Portugal, the imports of fish and fishery products amounted to about 17% of agricultural imports.

On the other hand, exports of fish and fishery products for all Mediterranean countries amounted to 2.5 million tonnes in 2009, about 7.7% of total world exports (32.5 million tonnes). The three main exporting countries of the region (Spain, Morocco and France) account for more than 75% of all exports of fish and fishery products in the region. Over the period 1999-2009, exports showed a positive trend in the Mediterranean, increasing by 37% compared to 35% recorded in the world. Only France, Libya and FYROM have seen their exports decrease (20%, 23% and 16%, respectively).

Although the Mediterranean region presents a strongly negative net trade balance (2.7 million tonnes) – only one country (Morocco) presented a positive net balance in terms of volume in 2009 – when looking at trade value estimations, five countries (Morocco, Turkey, Tunisia, Croatia and Albania) show a positive net balance. For these countries, the net export revenues are of vital importance to the economy. Their exports, estimated as a percentage of agricultural exports, varied from 3.2% for Turkey to as much as 46% for Morocco (see Table 4). The countries with the strongest trade balance deficits in 2009 were Italy, France, Spain, Portugal and Egypt.

Despite a highly negative trade balance, some European Union countries are important exporters and show positive trends, with their growth in exports being higher than imports. This is the case of Spain, which showed a 38% growth in export volumes during the 1999-2009 period compared to 23% in imports, and also the case of Portugal with a 43% growth in export volumes compared to 18% in imports.

It is important to highlight the fact that due to the high perishability of fish and fishery products, 90% of the world trade in fish and fishery products in terms of quantity (live weight equivalent) consists of processed products. Fish are increasingly traded as frozen food (39% of the total amount in 2010, compared with 25% in 1980). Processed and preserved fish have nearly doubled their share in total quantity, going from 9% in 1980 to 16% in 2010. Trade in live, fresh and chilled fish represented 10% of the world fish trade in 2010, higher than the 7% in 1980, reflecting the improved logistics and the increased demand for unprocessed fish (FAO, 2013a).

Similar trends are observed in the Mediterranean area, where the most traded commodities (14.4 million tonnes in 2009) are also frozen, which reached 43% of total imports due to an increase of about 60% in the past ten years. The second most traded commodities are live, fresh or chilled crustaceans and molluscs (13%), followed by fishmeal (12%), fresh or chilled fish (12%) and processed or preserved (mainly canned) fish (9%).

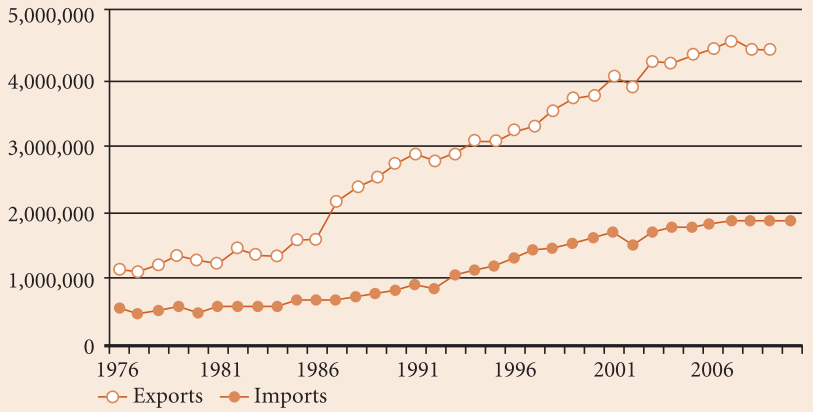
Figure 4, 5 and 6 show the evolution of trade imports and exports for the three groups of Mediterranean countries considered (European Union, North African and Other). Besides presenting the different trade trends for each group of countries, they also detail the main imported and exported commodities. It is important to note that exports are related to the structure of fish production in a given country. Thus, exports can be related to aquaculture production (i.e. Greece, Croatia and Turkey with sea bream and sea bass, tuna and trout), or to capture fishery production (Morocco with pelagic fish, fish meal and cephalopods, or Tunisia with shrimps and cephalopods). The case of Spain is different as its exported commodities are not only produced by its coastal fisheries and aquaculture industry but also by its seafood processing industry, strongly based on long distance capture fisheries from its own fleet or partner fleets and imports of semi-processed commodities (e.g. frozen pelagics).

As for the origin of imports, recent studies estimate that about 23% of fishery products imported by Mediterranean countries come from the Mediterranean Sea itself. Spain, Morocco and France are the main suppliers with more than 70% of these imports. The non-European Mediterranean countries tend to import products from the EU with a lower commercial value, while they export molluscs, fresh and chilled fish and crustaceans, which have a higher commercial value to the EU (Malvarosa and Young, 2010).

Trade statistics on import value (United Nations, 2012) of Mediterranean countries indicate similar relations. Thus, in 2009, about 28% of imports came from the Mediterranean itself, and the rest mainly from northern Europe, Asia and Latin America. For the same year, more than 50% of imports originated from: Spain (10.6%), the Netherlands (6.2%), the United Kingdom (5.9%), Norway (5.1%), Denmark (4.4%), France (4.4%), China (4.1%), Argentina (3.8%), Morocco (3.8%) and Vietnam (3.1%).

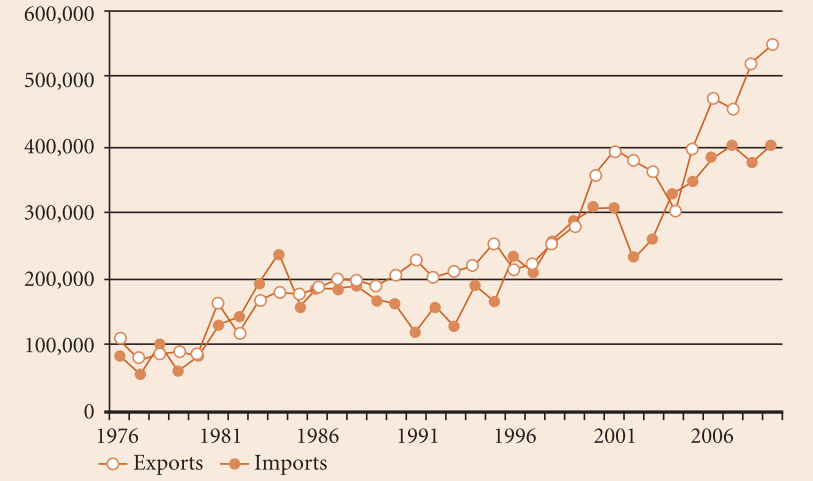
Besides general socio-economic conditions that might influence the sustainability and growth of the fishery trade, the evolution of production, transportation costs and the prices of fishery products and alternative commodities, including meat and feeds are other important factors.

Figure 4 - Imports and exports of fishery products in the EUMC by volume (in tonnes)



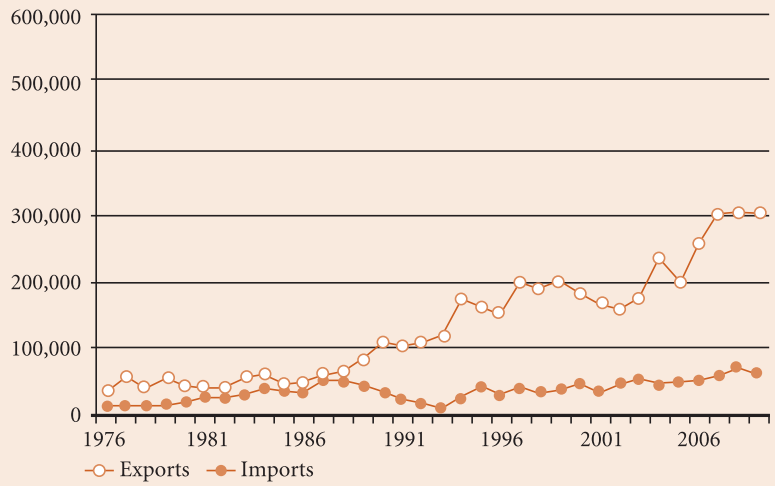
Main importing countries: Spain (36%); France (26%); Italy (22%); Portugal (9%).
Main exporting countries: Spain (57%); France (20%); Italy (8%); Portugal (8%).
Main imported commodities: Cephalopods, frozen (10.8%); pelagic, canned (9.3%); Crustaceans, frozen (8.8%); pelagic, frozen, whole (7.7%); demersal fish, fresh (5.8%).
Main exported commodities: Pelagic, frozen, whole (26.9%); Pelagic, canned (7.7%); demersal fish, fresh (7.5%); pelagic fish, fresh (7.1%); Cephalopods, frozen (6.7%); demersal, frozen, whole (5.4%).

Figure 5 - Imports and exports of fishery products in PMAN by volume (in tonnes)



Main importing countries: Egypt (63%); Morocco (15%); Tunisia (12%).
Main exporting countries: Morocco (95%); Tunisia (4%).
Main imported commodities: Pelagic, frozen, whole (35.8%); marine fish nei, frozen, whole (24.9%); Pelagic, canned (11.9%); Crustaceans, frozen (5.4%).
Main exported commodities: pelagic, canned (26.1%); pelagic, frozen, whole (19.1%), pelagic, meals (16.7%); Cephalopods, frozen (15.6%); marine fish nei, body oils (7.2%).

Figure 6 - Imports and exports of fishery products in the OMC by volume (in tonnes)



Main importing countries: Turkey (39%); Israel (16%); Croatia (12%).
Main exporting countries: Turkey (57%); Croatia (21%); Israel (4%).
Main imported commodities: pelagic, frozen, whole (19.0%); pelagic, meals (16.8%); pelagic, canned (15.2%); marine fish nei, frozen fillets (9.8%).
Main exported commodities: demersal fish, fresh (22.4%); Pelagic fish, fresh (12.5%); Pelagic, canned (9%); pelagic, cured (7%); freshwater and diadromous, frozen, whole (6.9%).

Note: The import and export percentages indicated between brackets for different countries as well as for commodities (FAOSTAT Group) are calculated with respect to the trade volume within each country group.

nei: not elsewhere identified.

Source: FAO, Fishstat.

Seafood distribution channels and transport

Like other agro-food products, fish and fishery products must pass through the distribution channels in order to reach the end-user or consumer. What differentiates them is their high heterogeneity, which is based on different geographical origins and production methods (artisanal fisheries, deep sea fisheries, freshwater aquaculture, marine aquaculture, etc.), the very large number of species belonging to different animal groups and diverse ecosystems (cephalopods, bivalve molluscs, crustaceans, freshwater and diadromous fish, demersal fish, pelagic fish, etc.) and the wide variety of products packaged, transported and processed in different ways (fresh, chilled, frozen, dried, canned, processed, etc.). All this affects the very different ways through which fish and fishery products enter the distribution channels.

Seafood distribution channels

Moreover, as mentioned here above, with regards to seafood consumption, Mediterranean countries are all very different. Their markets are very diverse in terms of range of products and therefore distribution channels. Therefore, it would be pointless to present one or several typical distribution channels.

Traditionally, the distribution channels in most importing countries were characterised by a series of different links in the same chain including various stakeholders

such as importers, distributors, wholesalers, food brokers and agents, with each of them performing a specific task. More recently, increased competition and improved logistics have shortened the chain in many markets with imported products often being bought directly from source by the wholesaler or by the retail chain operator (FAO, 2005-2013a).

While this is especially the case for frozen, preserved and canned seafood, the distribution patterns for fresh and chilled seafood are also changing. The lack of branded fresh seafood makes easier the substitution of the product and the supplier. In fact, the growth of international trade in fish products and the expansion of free trade areas have led to a proliferation of smaller operators in the wholesale sector (FAO, 2005-2013a).

In most countries, the largest wholesalers that previously ensured the distribution at national level had to limit their activities to their geographic area. This trend, coupled with the fact that many large supermarket chains buy directly from producers – especially aquaculture products – has led to a general weakening of the wholesalers of seafood and in many developed countries this category is currently on the defensive.

However, some local and regional wholesalers have successfully managed to refocus their activities, either by specialising in specific product groups, by vertically integrating retail services or home-delivery, or by establishing a close relationship with retail chains, where, essentially, the retail chain outsources to the wholesaler/importer who becomes responsible for purchase and distribution for the entire chain. When the market is very large geographically, this may be done at regional rather than at national level.

It should also be noted that through generational changes, many family import and wholesale businesses have modernised their operations with more streamlined processes and solid company structures now using information technology in all aspects of their operations.

In most markets, the traditional role of the agent has also undergone changes. Improved logistics and communication have facilitated a more direct contact between supplier and importer, thus reducing the role of the agent. On the other hand, the pressure of time, increased specialisation and outsourcing of services have also created a new role for agents seeking new products and markets. This includes companies specialising in products with environmental (both wild and farmed) or organic certification (farmed).

Numerous international studies have documented the increasing power exercised in food distribution by the retail chains. Despite the negative impact of competition on suppliers and small retailers and fishmongers, the overall positive effects of modern retail channels include lower prices for consumers, better access and greater convenience. It is also clear that supermarket chains offer important opportunities for volume sales at low-cost. For example, in the European and North American markets, the chains have played an important role in the promotion and volume

sales of aquaculture products such as salmon, bass, bream and catfish, and more, by making fish and fishery products affordable, especially in hinterlands where the consumption was traditionally lower than in coastal or lakeside regions.

In the Mediterranean, traditional fishmongers and small local markets have fared better than in northern Europe or in America, and their share of total sales is greater than elsewhere. However, although the absolute percentage may be higher, the tendency to sell a higher proportion through retail chains is still similar. Another recent phenomenon observed in many European countries, especially at a time of economic crisis, is the success of specialised chains selling frozen food only, including fish. Although such outlets are not new, their recent success is strongly related to the fact that, more than ever, consumers choose less-costly commodities.

When addressing seafood markets, it is appropriate to distinguish between supply chains and value chains. Whereas the former is more concerned with the physical product and efficient delivery of goods from source to the final point of sale, the value-chain concept is broader, highlighting not only the role of all the various actors and stakeholders in the chain, but also the flow of non-tangible assets such as information, needs, attitudes and beliefs which have an impact on the consumer's choices. By understanding how each activity in the chain adds value to the products, a successful company will be able to refocus its business activity, improve its competitive advantage and therefore grab a greater share of the total value created by the chain.

Transportation

Sustained demand and trade liberalisation policies have enabled an increase in the share of seafood that is traded internationally. In addition, developments in fish preservation, processing and transport have significantly facilitated this trade. As a result, fish and shellfish can nowadays be produced in one country, consumed fresh locally or abroad after transportation, or can be exported to be processed in a second country and then consumed locally or re-exported to a third country.

Due to the high perishability of fresh fish, 90% of the trade volume (live weight equivalent) of fish and fishery products consists of processed products (FAO, 2003). Besides being a sensitive process, the transport of whole fresh fish, is also costly and not very rational when it is not as such the final product. The global routing of seafood requires that they are properly handled, processed and stored to avoid deterioration, maintain their quality and nutritional value and extend their shelf life.

Fish and shellfish are traded live, fresh and processed (frozen, dried, canned, prepared meals, etc.) and transported by sea, land and air (FAO, 2005-2013b). They require very careful handling, from the fishing or farming site to wholesale and retail markets as well as to processing units. Live, fresh and frozen fish require special care compared to dried or canned fish. Throughout the transportation process, it is particularly important to take care of fresh, frozen or chilled fish and shellfish and their products to minimize any rise in temperature of the product and to ensure that the temperature, as appropriate, is maintained under controlled conditions (WHO and FAO, 2009). This requires the use of insulated containers (reefers) or transport

vehicles as well as adequate quantities of refrigerants or mechanical refrigeration. Modern containers can now associate refrigeration techniques to a modified or controlled atmosphere (FAO, 2003-2013).

Ambient temperature during storage and transportation is of great importance and it usually differs depending on the mode of transportation, whether by air or sea. Sea transport offers a relatively steady temperature compared to a more fluctuating temperature during air transport. However, sea transportation takes much longer than airfreight (Valtýsdóttir *et al.*, 2010).

Fresh, thawed unprocessed fishery products and cooked and chilled products made from crustaceans and molluscs must be maintained at temperatures approaching that of melting ice (FSAI, 2013). Thus, during transport, the temperature should be maintained between 0º and 4º C, using ice or any other appropriate system, throughout the whole process of loading, unloading, transportation, handling, or storage. If fishery products are kept under ice, melt water must not come into contact with the products.

As regards frozen fishery products, with the exception of frozen fish in brine intended for the manufacturing of canned food, during transport, they must be maintained at a constant temperature, not higher than –18º C for the whole product, possibly with short upward fluctuations of no more than 3º C. However, food industry operators are not required to comply with this requirement when frozen fishery products are transported from a cold store to an approved establishment to be thawed on arrival for the purposes of preparation and/or processing, if the journey is short and the competent authority authorises (FSAI, 2013).

It is should be highlighted that the method used to transport fish and fishery commodities depends on several factors, such as the value and the characteristics of the commodity itself (i.e. live shellfish, fresh fish, frozen, canned products, etc.), the volumes transported (e.g. small volumes of high value fresh fish from artisanal fisheries or large volumes of whole frozen tuna from industrial fisheries), the distance and/or place of origin/destination (e.g. harbour, airport, distribution platforms, etc.).

The Eurostat database on international trade (Eurostat, 2013) (i.e. extra-community trade of the EU27 since 2000 by mode of transport: HS2-HS4) is one of the few statistical sources providing information on the mode of transport. Data for fish and crustaceans, molluscs and other aquatic invertebrates for the European Union (EU27) show that the main method used is sea transport. Thus, 74.8% of the import volumes were transported by sea in 2012, followed by road (21.4%) and air (2.8%). The use of the sea freight was even higher in the case of exports (93.8% of the volume). As regards the type of commodities, fish fillets and other fish meat (minced or not, fresh, chilled or frozen), 31.9% of import volumes were mainly transported by sea in 2012 (81.7%), followed by road (13.1%); whereas fresh or chilled fish (excluding fish fillets and other fish meat), 22.7 of import volumes were first transported by road (55.3%), followed by sea (38.4%).

It is well known that improved logistics and distribution can drastically reduce the cost of transportation, thereby allowing companies to benefit from situations where

there is a large difference in the cost of labour or by opening new market opportunities. This is the case for the transportation of fishing raw material from North American and European companies to Asian countries (including Thailand, China and Vietnam) where commodities such as groundfish, shrimp and salmon are processed for re-exports to Western and Asian markets alike. This is also the case in Europe for smoked salmon, which is now mainly produced in Poland and the Baltic countries, and for the production of canned fish in Poland, Portugal and Morocco. Thanks to improved logistics, China and other suppliers have also successfully created new markets for frozen products in the Middle East, Egypt and Sub-Saharan Africa.

Transportation of live fish and shellfish. Crustaceans (such as lobster and spider crab) are transported live in humid and cool packages. Bivalves (such as oysters and clams) must be handled carefully, well packaged and transported at the appropriate temperature (avoiding extreme temperatures) to keep them alive and in good condition. Although it is not common in the Mediterranean, certain fish species intended for human consumption (e.g. catfish and perch) are transported alive. Most finfish are transported live in water supersaturated with oxygen and maintained at a sufficiently low temperature enough to reduce their metabolism. Some tropical fish may not support temperatures below 10 °C. Fish are often starved (also called conditioned) before transportation to reduce their metabolism and increase the storing density (FAO, 2005-2013b).

Airfreight. Air cargo transports over 5% of the world's annual catch and the growing demand for fresh fish increases the demand for airfreight (FAO, 2005-2013b). However, successful air transport of fish and seafood requires special care in preparation and handling during shipment, and excellent communication between the sender, the carrier and the consignee. It should also be noted that platforms often perform cargo transfers under heavy time constraints and the fact that they use combined passenger-cargo transportation, entry and exit in all markets can influence the delivery and quality of the delivered products. Due to the higher costs of air transportation compared to boat or road, most of the transported products are products of high value and perishable. Thus, about 85% of EU27 imports from outside the EU27 are fresh or chilled fish, fish fillets or crustaceans (Eurostat, 2013). In the case of Spain, for instance, about 80% of fresh or chilled hake imports are transported by air from countries outside the EU, mainly from South Africa, Chile, Canada and Namibia.

Land or sea transport. As for fresh, chilled and frozen products, the most challenging aspect of fish transportation by sea or by road is the maintenance of the cold chain and the optimisation of storage and stowage density. To maintain the cold chain, it is necessary to use refrigerated containers (reefers) or refrigerated vehicles and adequate quantities of refrigerants or mechanical refrigeration. Continuous temperature monitors are used to ensure there is no break in the cold chain during transportation (FAO, 2005-2013b). Road transport is most commonly used for fresh fish and also for frozen products within the EU and for other journeys shorter than four days, such as the trade between Morocco and Spain. On the other hand, reefer shipping

is preferred for frozen products and longer distances (e.g. from Galicia to the Near East) for journeys longer than one month. Recently, transportation of sea bass and sea bream from Turkey and Greece to the Russian market is made by land. Until a few years ago, these products were shipped by air. Excellent developments in food packaging and handling allow for rapid and efficient loading, transport and unloading of fish and fishery products by road or by sea. Also, transportation of fish by sea allows for the use of special containers that carry fish under vacuum, modified or controlled atmosphere, combined with refrigeration.

Processing of fishery products

Fish processing primarily involves the use of preservation techniques in order to maintain the quality and increase shelf life. Seafood products should also be presented in ways that are attractive to the consumers in the major markets. Fish processing technology has progressed in recent years, focusing on aspects such as nutrition, health, safety, sustainability and added value for consumers. In order to be profitable and to survive in the market, seafood companies constantly need to improve processing, fully use the available resources and develop new products.

Trends in the seafood Industry

Fish processing can be subdivided into fish handling, which is the preliminary processing of raw fish, and the manufacture of fish products. Another natural subdivision would be primary processing, which involves gutting, filleting and freezing fresh fish for subsequent distribution to fresh fish retailers and catering outlets; and the secondary processing when products are chilled, frozen and canned for the retail and catering sectors (RSE, 2004).

Today, a large number of species, including large marine crustaceans and bivalve molluscs, are kept alive to maintain quality until consumption. For these products, the most important requirement to maintain their quality of fish is to keep them alive for as long as possible before cooking and consumption.

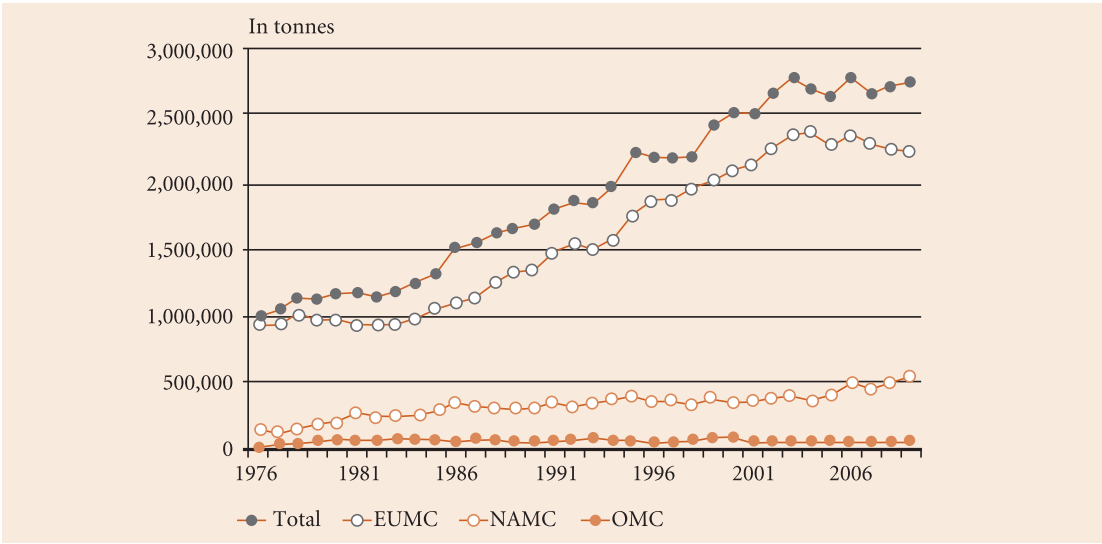
Several methods are used to preserve fish (FAO, 2003-2013). Some employ techniques involving temperature control, the use of ice, refrigeration or freezing while other techniques involve the control of water activity and include drying, salting, smoking and freeze-drying. The techniques can be based on the physical control of microbial fish loads, such as microwave heating or ionizing irradiation, or on the chemical control of microbial activity and loads by adding acids to fish products, for example. Some techniques also involve the redox, such as vacuum packaging. Most often, a combination of different techniques is used for the preservation of fish.

Finally, fish processing operations include proper residue management techniques. Further processing of fish into a wide variety of value-added products (prepared meals, surimi, etc.) is now common due to the growing demand for food products that are ready to eat or require little preparation before consumption (FAO, 2003-2013).

The Mediterranean processing sector of fishery commodities

The production of fishery commodities[3] has been constantly increasing in the Mediterranean since the 1970s. As for EU Meditarranean countries (EUMC), which are the main producers in the region, the growth took place mainly during the 1980s and 1990s and is currently decreasing. On the other hand North African and other Mediterranean countries, with much lower production volumes, are showing steady growth (see Figure 7).

Figure 7 - Evolution of fishery commodities production in Mediterranean countries



Source: FAO, Fishstat.

The majority of production (excluding fresh fish) is frozen and prepared or preserved (mainly canned) products, together accounting for about 75% of fish and fishery commodities produced in the region (Table 5).

3 - As for FAO statistics the term "commodity" stands for product, which in the case of *trade data* can be traded in different product forms as whole (live, fresh or chilled, frozen, etc.) or in parts (fillets, meat, minced, fins, etc.). In the case of *Production data*, refers to the quantities of preserved and processed fishery commodities by country and by commodity, produced both ashore and on-board vessels utilising catches from commercial fisheries and aquaculture production (more details at: www.fao.org/fishery/statistics/global-commodities-production/3/en)- Data series on production of processed and preserved fishery products are reported in terms of quantity. Production data for "fish, live, fresh or chilled", "live crustaceans", "live molluscs", "fresh unpeeled crustaceans" and "fresh unshucked molluscs" are not included in the relevant tables, as these items can be neither considered as preserved nor as processed products.

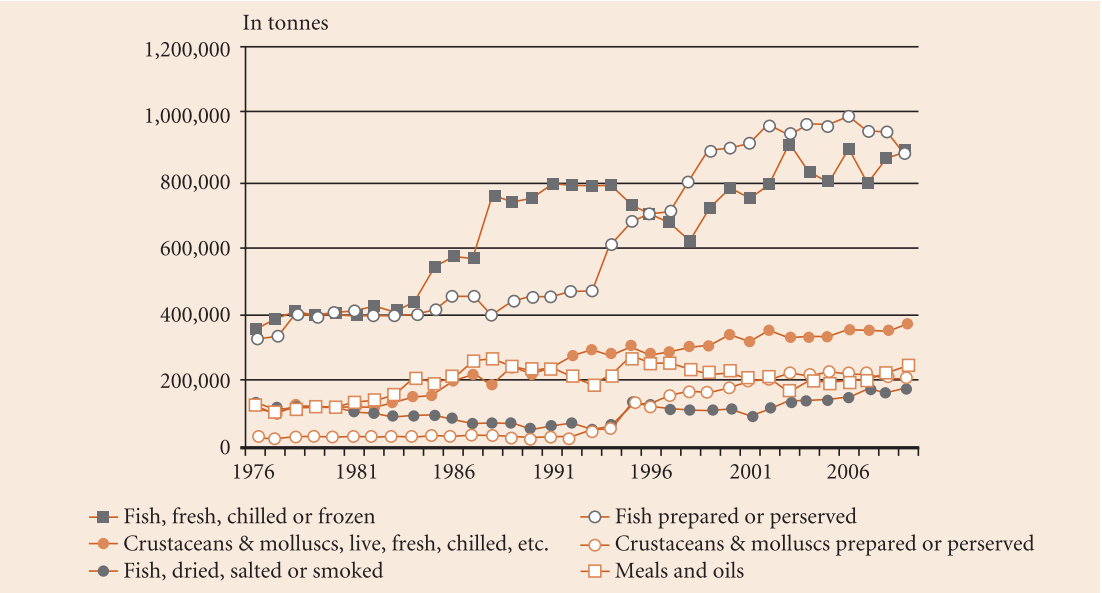
Table 5 - Production of fishery commodities in Mediterranean countries (2009)

Commodity type	Tonnes	%
Frozen commodities	1,102,044	39.8
Prepared or preserved (mainly canned)	967,686	35.2
Fish meals and fish oil	260,137	9.4
Fish fillets, fresh or chilled, nei	124,058	4.5
Smoked	57,752	2.1
Dried, salted or in brine	50,867	1.8
Other	61,819	7.2
Total	**2,767,163**	**100**

Source: FAO, Fishstat.

Figure 8 presents the evolution of the fishery production in Mediterranean countries and shows how these groups of commodities (fresh, chilled, frozen, prepared or preserved) are those that have experienced the largest expansion during the past decades, whereas commodities with lower added value (i.e. fish meal) do not show that positive trend. The growth of crustaceans and molluscs, live, fresh, chilled, etc. is equally significant. The seven main commodities produced (45.5% of the whole production) are prepared or preserved tunas (10.2%), frozen marine fish (7.2%), fish meal (7.2%), prepared or preserved sardines (6.0%), frozen skipjack tuna (5.9%), fresh or chilled fish fillets (4.5%), frozen sardines (4.5%).

Figure 8 - Evolution of fishery commodities production in Mediterranean countries by groups of commodities (FAO major group)



Source: FAO, Fishstat.

The Seafood processing sector in European countries, the case of Spain

The Spanish fishery products processing sector is the largest in Europe, followed by Denmark, Germany, France and United Kingdom. Its production accounts for about 22% of the fishery commodities in Europe (EU 27) and 43% of the Mediterranean countries. It also has the most diversified production with 60 statistically recorded commodities. The estimated Spanish fishery commodities output increased from 49,123 tonnes in 1976 to 1,318,389 tonnes in 2003, with a slightly lower production of 1,187,666 tonnes in 2009. In Spain there are more than 700 processing units (60% with less than 20 workers) and nearly 20,000 workers. Galicia is the main producing region, although many other companies are also established in other coastal regions, such us Andalucía, the Basque Country, Cantabria or Valencia, as well as in the inland regions, served by a good network of communications (e.g. Delfín Ultracongelados S.A in Toledo or Caladero SLU in Zaragoza), and nearby important markets at wholesale halls (Mercasa network, e.g. Mercamadrid).

About half of the commodities produced in 2009 were frozen products (606,326 tonnes), followed by canned products (33%, 386,750 tonnes), fish meal and fish oil (7%, 85,722 tonnes), cured commodities such as salted cod, smoked salmon, etc. (3.2%, 38,266 tonnes), and fresh fillets (1.8%, 21,750 tonnes), the remaining 4.2% being made of different prepared or preserved commodities, such as surimi, roes, caviar substitutes, etc.

A recent study (García-Arca *et al.*, 2011) identified three types of companies based on the characteristics of their supply. Type 1 (the most complex and common in larger companies) is composed of companies where most of the raw materials are obtained by their own fleets, farms, or through medium/long term agreements. These companies have one or several processing and logistics plants. Type 2 is quite similar to the previous type, but with primary processing factories abroad (South America and Africa) but not in Spain. Type 3 refers to companies for which the supply of raw material is not included, although they have units for first and second processing only in Spain, also with distribution plants.

Frozen seafood. The companies that are active in the frozen fish market sector in Spain tend to be large groups, with mainly Spanish capital, although with a strong international presence and affiliates in Africa and South America. These companies are orientated towards mergers and acquisitions. Among the best-known companies there are Pescanova, Grupo Freiremar and Grupo Amasua, which process their products from imports and captures from their own fleet, normally equipped with freezing facilities. Grupo Ibérico de Congelados, Grupo Pereira and Grupo Banchio are other significant companies of frozen seafood are (Catarci, 2008). In 2009, about 51% of the fishery commodities produced were frozen products, including whole, headed/gutted and filleted fish, crustaceans, value-added products and seafood preparations. Pelagic fish (different tuna species but also swordfish, sardines, etc) accounted for about 40% of the production. Cephalopods (squids, cuttlefishes and octopus) accounted for 22% and crustaceans for 9%. The rest was compoased of other marine and freshwater fish, whole or filleted demersal fish and bivalve molluscs.

Canned seafood. The production of canned seafood in Spain is dominated by tuna meat (mostly light meat and white meat tuna) and tuna paté, salads or burgers, as well as many other canned seafood products (mussels, squid, clams, sardines and sardinellas in different presentations (with olive or vegetable oil, in brine, tomato sauce, in salads, etc.). Their products are marketed in Spain and elsewhere under many different house or retailer brands. The main tuna processors in Spain are Grupo Calvo, Isabel Garavilla, Jealsa-Rianxeira and Albacora-Salica. Those corporations are all based in Spain and, unlike their Italian and French counterparts, they still process tuna domestically, even if they have increasingly resorted to the import of pre-cooked frozen loins, and they also have various processing units in third countries (including Morocco and South America). These companies also have tuna seiner vessels, boats and merchant ships. Other important seafood canning processors in Spain are Frinsa (*Grupo Frigoríficos del Norte*) and Bernardo Alfageme SA. About one third (386,750 tonnes) of the fishery commodities produced in 2009 were canned products. Tuna accounted for 55% of production, pelagic fish for 20% (sardines, anchovies, mackerel, etc.), cephalopods for 15% and bivalve molluscs for 8%. More detailed information on the Spanish production and trade of the Spanish canning (preserve and semi-preserve products) sector can be obtained from ANFACO (National Association of Manufacturers of Canned Fish), which represents more than 200 Spanish seafood processing companies (ANFACO-CECOPESCA, 2011).

The seafood processing sector in North African countries, the case of Morocco

The Moroccan fishery processing sector is the largest among North African Mediterranean countries. With a growth of over 75% in the past decade, its production in 2009 reached over 505,000 tonnes accounting for more than 90% of fish and fishery commodities produced in these countries. The sector's production is based on national capture fisheries, most of them from the Atlantic (95%), and the majority (about 84%) of commodities included pelagic fish (sardine, anchovies, mackerel and tuna). Captures of cephalopods (octopus and squid) are also important as well as demersal fish and other marine fish (hake, sturgeon, bream, flatfish, monkfish, etc.). It should be noted that a very significant part of captures from the North Atlantic coast and the Mediterranean Sea are sold as fresh fish for direct human consumption, both locally and abroad, particularly in Spain. After Spain, Morocco is the second major exporting country of fish and fishery products of the whole Mediterranean, with more than half of this trade being sold to EU countries. Fish exports represent about 50% of agricultural products and about 12% of the whole country's exports. However, a large part of its production is still based on pelagic fish processed into low added value products. Thus, 28% of the production is made up of fishmeal and fish oil and about 26% of whole frozen fish. In Morocco, there are about 275 processing units (176 freezing plants, 44 canning plants, 31 curing/salting plants and 24 fish meal and fish oil plants) (FAO, 2004-2013). Most of the plants are located on the Atlantic coast (e.g. Agadir, Casablanca, Dakhla, Laâyoune, Safi and Tan Tan). There are also marine algae processing units (i.e. production of Agar) and a significant number of fresh fish packaging and export companies.

Canned seafood. Canning (preserve and semi-preserve) companies are located along the Atlantic coast and in the south, mainly in Safi and Agadir, and provide more than 25,000 jobs. In 2009, most of the production of canned products (more than 140,000 tonnes) were small pelagic fish, mainly sardines with 115,000 tonnes, and also anchovies (15,000 tonnes) and mackerel (11,000 tonnes). Small volumes of tuna cans (about 7,000 tonnes) were also produced. Although most of the raw materials come from national fisheries due to stagnant captures, there are also some imports, e.g. anchovies from South America (FENIP, 2011). It should be noted that Morocco is the world's first exporting country of canned sardines (in vegetable oil, in olive oil, in tomato sauce, etc.). However, the sector is somehow fragmented, and thus, more than half of the canning production is undertaken by small companies. Nevertheless, there are some important companies, such as the Aveiro (groupe DOHA), Belma SA, LGMC (*Les Grandes Marques et Conserveries Chérifiennes Reúnies*), Unimer and Consernor (*Conserveries Nord africaines*), which produce and distribute their own brands but also the products of other companies (e.g. European or North American supermarkets). Some of these companies belong to groups that also produce canned vegetables.

Frozen seafood. Due to the origin (capture landings) of raw material (fish and cephalopods), most seafood freezing units are located along the South Atlantic coast. In general terms, frozen products (e.g. sardines, octopus, cuttlefish, shrimps, sole, marine fish etc.) are lightly processed (e.g. whole frozen fish) and exported to other countries (i.e. Spain and Japan, and also Italy) for further processing.

Conclusion

To meet the food needs or nutritional and health reasons, the demand for seafood is expected to follow global trends and continue to grow in the Mediterranean countries. This trend is more significant in the groups North African and other countries, which will most likely reduce the current gap in the per capita consumption with respect to European countries. However, the present trade deficit is expected to worsen as Mediterranean fisheries sector have a more or less stable capture and the aquaculture production, with some exceptions (e.g. Egypt) and this production is not growing at the same pace as in previous years. In this context, the fishery industry should make better use of all available resources, especially the use of fishery by-products in order to be more efficient.

Following the reduction of trade barriers, improvements in food processing technologies, logistics and transportation, the demand for seafood in Mediterranean countries is satisfied by growing imports of fish and fishery products from the region itself but also from other areas of the world, i.e. Asia and Latin America. The most traded seafood commodities are frozen products followed by live, fresh or chilled crustaceans and molluscs, fish meal, fresh or chilled fish and prepared or preserved (especially canned) fish.

The seafood industry needs to constantly improve processing and logistics in order to be profitable, and also offer new products and added value to consumers. One of the main objectives would be its ability to obtain the necessary volumes of raw

material from various and different origins. Minimum processing will be required, not only to reduce costs (e.g. minimum packaging), prevent deterioration, ensure safety and extend shelf life of seafood products, but also, more importantly, to maintain their excellent quality and nutritional value.

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Table 1 - Food balance sheet of fish and fishery products in live weight and fish contribution to protein intake (year 2007)

	Production	Non-Food Uses	Imports-Exports	Stock Variat.	Total Food Supply	Population	Fish per cap. Sup.	Fish/Animal Proteins	Fish/Total Proteins
	(tonnes in live weight)					(thousands)	(kg)	%	%
Cyprus	4,950	3,957	22,325	0	23,318	854	27.3	12.9	8
France	749,894	10,499	1,361,462	11,115	2,111,972	61,714	34.2	12.2	7.9
Greece	209,352	121	22,473	0	231,704	11,112	20.9	9.8	5.3
Italy	465,637	40,695	1,079,535	0	1,504,477	59,305	25.4	11.8	6.5
Malta	3,783	16,667	25,754	0	12,871	406	31.7	13.9	7.3
Portugal	260,275	33,883	428,963	0	655,355	10,641	61.6	23.0	14.2
Slovenia	2,463	19	18,028	33	20,505	2,010	10.2	5	2.8
Spain	1,089,922	50,686	933,540	0	1,972,776	44,051	44.8	19.7	12.6
EUMC	**2,786,276**	**156,527**	**3,892,080**	**11,148**	**6,532,978**	**190,093**	**34.4**	**14.4**	**8.7**
Algeria	148,841	15	25,617	6	174,448	33,858	5.2	7.9	2
Egypt	1,008,007	1	329,772	0	1,337,778	80,061	16.7	21.7	5
Morocco	882,079	183,951	*- 351,776*	7,500	353,852	31,224	11.3	18.8	4
Tunisia	106,530	4	17,612	0	124,138	10,069	12.3	13.6	3.7
Libya	32,161	8	13,521	0	45,674	6,169	7.4	8.9	2.9
NAMC	**2,177,618**	**183,979**	**34,746**	**7,506**	**2,035.890**	**161,381**	**12.6**	**16.9**	**4**

Table 1 - Continuation

	Production	Non-Food Uses	Imports-Exports	Stock Variat.	Total Food Supply	Population	Fish per cap. Sup.	Fish/Animal Proteins	Fish/Total Proteins
	(tonnes in live weight)					(thousands)	(kg)	%	%
Albania	7,505	0	9,077	0	16,582	3,132	5.3	3.0	1.5
Bosnia & Herz.	9,625	0	16,165	0	25,790	3,778	6.8	6.4	2.2
Croatia	53,083	503	17,965	0	70,544	4,429	15.9	10.1	5.4
Israel	26,236	0	144,256	0	170,492	6,932	24.6	7.5	4.2
Lebanon	4,614	5	34,363	0	38,972	4,162	9.4	7.4	3.0
FYROM	1,218	5	11,594	0	12,807	2,040	6.3	4.6	2.1
Montenegro	911	0	1,733	0	2,644	621	4.3	2.5	1.5
Serbia	9,159	1	53,598	0	62,756	9,832	6.4	3.8	2.3
Syria AR	17,881	0	42,220	0	60,101	20,504	2.9	3.5	1.1
Palestine, O.T.	2,702	0	–	0	2,702	4,017	0.7	1.4	0.4
Turkey	772,471	178,734	*– 2,116*	0	591,621	73,004	8.1	8.5	2.3
OMC	**895,780**	**179,248**	**328,855**	**0**	**1,055,011**	**132,451**	**8**	**6.8**	**2.3**
Total Med	**5,859,674**	**519,754**	**4,255,681**	**18,654**	**9,623,879**	**483,925**	**19.9**	**13.3**	**5.7**

EUMC: EU Mediterranean countries; NAMC: North African Mediterranean countries; OMC: Other Mediterranean countries.
Source: FAO (2010b).

Table 2 - Fishery production (capture and aquaculture) in Mediterranean countries (year 2010)

	Capture				Aquaculture				Total Fishery	% of total
Country	Inland	Med. and Black Sea	Other seas	Total	Molluscs	Fish	Crustaceans	Total		
Cyprus	20	1,400		1,420		4,116		4,116	5,536	0.1
France	2,500	17,606	429,778	449,884	177,320	46,990	90	224,400	674,284	10.8
Greece	940	80,287	1,780	83,007	17,148	104,096		121,244	204,251	3.3
Italy	3,852	229,851	1,809	235,512	101,016	52,452	26.2	153,494	389,005	6.3
Malta		1,836		1,836		2,916		2,916	4,752	0.1
Portugal	<0.5	85	223,357	223,442	3,342	4,880	3	8,225	231,667	3.7
Slovenia	168	771		939	78	701		778	1,717	–
Spain	6,000	99,730	863,062	968,792	192,764	59,484	104	252,351	1,221,143	19.6
EUMC	**13,480**	**431,564**	**1,519,786**	**1,964,830**	**491,668**	**275,635**	**223**	**767,524**	**2,732,354**	**43.9**
Algeria		93,607		93,607	4	1,755	0.1	1,759	95,366	1.5
Egypt	263,847	77,389	43,974	385,210		918,793	792	919,585	1,304,795	21
Libya		50,006		50,006		240		240	50,246	0.8
Morocco	7,226	33,917	1,102,510	1,143,652	295	1,227		1,522	1,145,174	18.4
Tunisia	1,123	96,640		97,763	168	5,256		5,424	103,187	1.7
NAMC	**272,196**	**351,558**	**1,146,484**	**1,770,238**	**467**	**927,271**	**792**	**928,530**	**2,698,768**	**43.4**

Table 2 - Continuation

Country	Capture				Aquaculture				Total Fishery	% of total
	Inland	Med. and Black Sea	Other seas	Total	Molluscs	Fish	Crustaceans	Total		
Albania	3,041	3,104		6,145	1,410	1,086	8	2,504	8,649	0.1
Croatia	456	52,410		52,866	2,060	11,931		13,991	66,857	1.1
Israel	402	2,136	50	2,588		19,895		19,895	22,483	0.4
Lebanon	270	3,541		3,811		1,155	25	1,180	4,991	0.1
FYROM	177			177		1,491		1,491	1,668	–
Montenegro	534	611		1,145	200	590		790	1,935	–
Serbia	4,807			4,807		8,155		8,155	12,962	0.2
Syria	3,679	2,956		6,635		8,610		8,610	15,245	0.2
Turkey	40,259	445,680		485,939	340	167,381		167,721	653,660	10.5
OMC	**53,625**	**510,439**	**50**	**564,114**	**4,010**	**220,294**	**33**	**224,337**	**788,450**	**12.7**
Total	**339,301**	**1,293,562**	**2,666,320**	**4,299,182**	**496,145**	**1,423,200**	**1,048**	**1,920,390**	**6,219,572**	**100**
% of total	**5.5**	**20.8**	**42.9**	**69.1**	**8**	**22.9**	**0**	**30.9**	**100**	

EUMC: EU Mediterranean countries; NAMC: North African Mediterranean countries; OMC: Other Mediterranean countries.
Source: FAO, FishStat.

Table 3 - Main seafood supply sources of the Spanish market

Main species	Main import product form	Production source		Main product origins (country)	Main raw material origins (area)
Tuna	P&P	Capture	Imports from processors	Domestic, Ecuador, Mexico, Mauritius, Panama, Netherlands Antilles, France, Thailand, Guatemala, South Korea	Western Central Pacific, Eastern Pacific, Eastern Central Atlantic, Indian Ocean
Shrimp	Frozen	Aquaculture & capture		(Warm water) Argentina, Ecuador, China, Thailand, Nicaragua, (coldwater) Morocco	Asia Inland waters, Northwest Pacific, Southeast Pacific
Hake	Fillets, frozen	Capture		Namibia, South Africa, France, Chile, Argentina, domestic	South Atlantic
	Fresh or chilled (whole)				
Cod	Salted or in brine	Capture		Iceland, Sweden, Faroe Islands	North Atlantic, North Pacific
	Fillets, frozen			China, Iceland	
	Fresh or chilled (whole)			Denmark, Netherlands, domestic	
	Frozen (whole)			Russia, USA	
Squid	Frozen (whole)	Capture		Falkland Islands, India, China, Peru, domestic	Northwest Pacific, Southeast Pacific, Western Indian Ocean, Southwest Atlantic, Eastern Central Atlantic
Cuttlefish	Frozen (whole)			India, Morocco, China, domestic	
Octopus	Frozen (whole)	Capture		Morocco, Mauritania, Portugal, Senegal, domestic	Eastern Central Atlantic
Salmon	Fresh or chilled (whole)	Aquaculture		Norway, Sweden, Denmark	(Offshore farms) Norway

Table 3 - Continuation

Main species	Main import product form	Production source		Main product origins (country)	Main raw material origins (area)
Anchovies	Fresh or chilled (whole)	Capture		France, Italy, Morocco	Eastern Central Atlantic, Mediterranean & Black Sea
Sea bream	Fresh or chilled (whole)	Aquaculture		Domestic, Greece, Turkey	(Offshore farms) Greece, Turkey
Sea bass	–	Aquaculture		Domestic	(Offshore farms) Spain
Sardines, pilchards, etc.	P&P not minced	Capture	Imports from processors	Domestic, Ireland, Netherlands, UK	Eastern Central Atlantic, Northeast Atlantic, Mediterranean & Black Sea
Mussels	P&P	Aquaculture	Imports from processors	Chile	(Offshore farms) Chile, Spain, France, Italy
	Fresh or chilled			Domestic, Italy, France	
Surimi	P&P		Imports from processors	China, India, Belgium, Lithuania, Thailand	–
Clams	P&P	Aquaculture & capture	Imports from processors	Viet Nam, UK	(Brackish/marine farms) Viet Nam, Italy, UK, Portugal, (capture) Northeast Atlantic, Mediterranean & Black Sea
	Fresh or chilled			Italy, Portugal	
Scallops	Fresh or chilled	Capture		France, UK, Italy	Northeast Atlantic
	Frozen				
Megrim	Fresh or chilled (whole)	Capture		Domestic, France, UK, Ireland	Northeast Atlantic

P&P: processed and preserved.
Source: developed by the authors.

Table 4 - Trade volume and value of fish products (year 2009)

	Volume in tonnes					Variation 1999-2009 (in %)		Value in thousands of dollars			Exp. as % of agri-cultural exports	Imp. as % of agri-cultural imports
	Exports	Imports	Exports – Imports	Exports 1999	Imports 1999	Exports	Imports	Exports	Imports	Exports – Imports		
Cyprus	2,278	21,530	*- 19,252*	335	15,203	580	42	13,657	78,305	*- 64,648*		6.6
France	358,666	1,131,076	*- 772,410*	447,666	1,032,035	*- 20*	10	1,623,536	5,639,111	*- 4,015,575*		10.4
Greece	130,847	246,349	*- 115,502*	73,210	138,092	79	78	668,933	716,863	*- 47,930*		8.3
Italy	142,222	994,914	*- 852,692*	121,730	826,070	17	20	716,420	5,086,303	*- 4,369,883*		11.4
Malta	2,455	36,241	*- 33,786*	1,853	7,894	33	359	20,608	60,630	*- 40,022*		8.0
Portugal	141,406	401,109	*- 259,703*	99,011	345,860	43	16	631,061	1,584,654	*- 953,593*		16.8
Slovenia	5,026	17,688	*- 12,662*	2,222	12,490	126	42	26,641	83,589	*- 56,948*		3.1
Spain	1,053,471	1,576,473	*- 523,002*	762,229	1,282,166	38	23	3,178,574	5,930,555	*- 2,751,981*		17.8
EUMC	**1,836,371**	**4,425,380**	***- 2,589,009***	**1,508,256**	**3,659,810**	**22**	**21**	**6,879,430**	**19,180,010**	***- 12,300,580***		
Algeria	1,881	28,296	*- 26,415*	860	7,953	119	256	8,498	54,058	*- 45,560*		0.8
Egypt	5,199	249,845	*- 244,646*	903	245,606	476	2	14,184	476,135	*- 461,951*		5.9
Libya	981	15,551	*- 14,570*	1,279	3,829	*- 23*	306	5,117	51,990	*- 46,873*		2.4
Morocco	531,203	58,428	472,775	256,601	16,749	107	249	1,578,773	116,471	1,462,302	46.1	
Tunisia	20,597	47,045	*- 26,448*	11,834	9,562	74	392	154,335	67,065	87,270	11.0	
NAMC	**559,861**	**399,165**	**160,696**	**271,477**	**283,699**	**106**	**41**	**1,760,907**	**765,719**	**995,188**		

Table 4 - Continuation

	Volume in tonnes					Variation 1999-2009 (in %)		Value in thousands of dollars			Exp. as % of agri-cultural exports	Imp. as % of agri-cultural imports
	Exports	Imports	Exports – Imports	Exports 1999	Imports 1999	Exports	Imports	Exports	Imports	Exports – Imports		
Albania	3,645	10,071	*- 6,426*	2,811	5,882	30	71	32,604	27,190	5,414	36.3	
Bosnia and Herz.	3,512	13,218	*- 9,706*	.	6,739		96	13,262	37,196	*- 23,934*		2.1
Croatia	32,825	45,258	*- 12,433*	17,521	25,929	87	75	165,154	105,092	60,062	12.0	
Israel	3,832	61,156	*- 57,324*	1,331	58,527	188	4	25,992	227,982	*- 201,990*		6.1
Lebanon	1,150	28,263	*- 27,113*	353	21,743	226	30	6,264	97,700	*- 91,436*		4.0
FYROM	410	8,158	*- 7,748*	486	7,696	*- 16*	6	1,105	25,272	*- 24,167*		3.6
Montenegro	255	3,215	*- 2,960*					1,488	13,222	*- 11,734*		2.4
Palestine, O.T.	59	3,479	*- 3,420*					188	12,602	*- 12,414*		2.3
Serbia	1,235	31,038	*- 29,803*					6,773	102,535	*- 95,762*		9.7
Syria	115	24,444	*- 24,329*	11	17,307	945	41	635	60,047	*- 59,412*		1.8
Turkey	62,018	144,236	*- 82,218*	31,005	98,662	100	46	346,259	191,505	154,754	3.2	
OMC	**109,056**	**372,536**	***- 263,480***	**53,518**	**242,485**	**104**	**54**	**599,724**	**900,343**	***- 300,619***		
Total Med.	**2,505,288**	**5,197,081**	***- 2,691,793***	**1,833,251**	**4,185,994**	**37**	**24**	**9,240,061**	**20,846,072**	***- 11,606,011***		

EUMC: EU Mediterranean countries; NAMC: North African Mediterranean countries; OMC: Other Mediterranean countries.
Source: FAO, Fishstat.

CHAPTER 11

TRADE AND LOGISTICS: THE CASE OF THE OLIVE OIL SECTOR

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Olive oil is a typically Mediterranean product with a production that is essentially limited to a few countries that are located along the northern and southern Mediterranean shores, with a consumption that has historically been primarily confined to the region (Migdalas *et al.*, 2004). Recent generic[1] and commercial[2] promotion efforts have somewhat stimulated interest in the consumption of olive oil in demanding countries where olive oil is not traditionally consumed, but olive oil consumption remains highly concentrated in production areas, particularly in the European Union. Although the global production and consumption have increased significantly, olive oil continues to occupy a small share[3] in the market of liquid vegetable oils, as its share does not exceed 4%. This is why, even in producing countries, consumers, families and restaurants easily substitute olive oil by cooking oils and butter (Vossen, 2007).

This chapter aims at analysing different aspects of the olive oil sector in general (production, consumption trade and logistics). Situations of individual countries such as Tunisia, Syria, Lybia and Italy or the Greek Island of Creete will be highlighted as special illustrations.

1 - Made by countries that are members of the International Olive Council based in Madrid, Spain (IOC).
2 - Made by commercial companies and/or individual countries.
3 - In terms of volume.

Olive oil trade

Trends in olive oil trade were globally on the rise by about 4% annually over the period 1990-2013, even though world production has increased by only 2.6%[4] (Table 1). This is an indication that world consumption is expanding as countries where olive oil is not traditionally consumed (USA, Canada, Australia, Brazil, Japan and China) are taking an increasing share in the world consumption of olive oil.

Trends in the international trade of olive oil

This phenomenon is also taking place within the European Union (EU) as markets such as those of the UK and Germany are demanding higher amounts of olive oil. Hence was the historical pattern in which the Mediterranean Basin which is the predominant area of olive oil production and consumption is changing (Krystallis and Ness, 2005). While this can be considered a favourable evolution as the health and culinary properties of olive oil are shared by increasing numbers of consumers and countries, its market value is however materialised by average prices that are not growing sustainably. This implies that in the absence of sustained promotion efforts providing additional scientific, nutritional and culinary information to new olive oil consumers, aimed at shifting their overall demand, further expansion of olive oil consumption worldwide can be forthcoming only through reductions and/or stagnations in its price. This, in turn and in the long run, can be detrimental to the promotion of olive oil production and could compromise investment requirements to enhance its quality (Mili, 2006).

World olive oil market: major players

The major player of the world olive oil market is the EU. However, within the EU, Spain, Italy and to a smaller degree, Greece, account for almost the total EU olive oil production (97%). Spain is currently the leading olive oil producer with 62% of the total EU production and about 40-45% of world production, depending on the year (European Commission, 2012; IOC, 2013).

Spain has experienced a significant growth since the 1980s when it used to produce a third-to-half of what it has recently been producing, over a million metric tonnes per year, as a result of the massive plantations and important investments made in the country during the 1980s and 90s. The EU has strongly supported this expansion, through significant incentives for production, export and storage provided within its Common Agricultural Policy (CAP) on the one hand; and the almost exclusive funding of massive olive oil campaigns which took place from the mid-1980s to the early 2000[5].

Outside the EU, Tunisia has always been an olive oil producer with a continuous increase in production levels. In addition, until the rise in European production during the 1990s, particularly in Spain, the country has always been present on the world market by exporting comparable[6] but variable volumes to those coming out of the EU.

4 - Based on IOC statistics (www.internationaloliveoil.org).

5 - In the mid-2000, voluntary EU subsidies were suspended for a number of years and then resumed timidly way as the IOC has conducted a major review of its structure and mission.

6 - Even higher for some years.

Table 1 - International Olive Oil Flows

Years	World production	EU production	World exports	EU exports	Spain exports	Italy exports	Greece exports	Tunisian exports	Turkey exports	Other exports
1990/91	1,453.0	994.0	337.0	146.0	65.8	66.5	6.0	161.5	10.0	19.5
1991/92	2,206.0	1,719.0	303.5	174.0	62.8	90.1	12.8	96.5	10.5	22.5
1992/93	1,811.5	1,391.5	298.0	161.5	51.6	90.8	10.3	110.0	5.5	21.0
1993/94	1,825.0	1,359.5	378.0	182.5	54.6	104.8	9.2	178.0	9.0	8.5
1994/95	1,845.5	1,371.0	368.5	182.5	54.0	105.8	5.5	104.0	55.0	27.0
1995/96	1,684.0	1,403.5	256.5	165.0	48.8	90.5	11.0	26.5	19.0	46.0
1996/97	2,595.0	1,754.5	438.0	220.0	66.7	129.5	5.2	115.0	40.5	62.5
1997/98	2,465.5	2,116.5	407.0	227.0	76.2	123.5	8.0	117.0	35.0	28.0
1998/99	2,402.5	1,707.0	506.0	208.5	63.6	125.3	5.4	175.0	86.0	36.5
1999/00	2,374.5	1,878.5	444.5	298.5	87.7	182.7	8.2	112.0	16.5	17.5
2000/01	2,565.5	1,940.5	502.0	291.0	88.3	173.0	10.0	95.0	92.0	24.0
2001/02	2,825.5	2,463.5	394.5	324.5	112.5	182.9	10.0	22.0	28.0	20.0
2002/03	2,495.5	1,942.5	483.0	313.5	107.0	176.1	15.0	40.0	74.0	55.5
2003/04	3,174.0	2,448.0	657.5	324.5	114.2	181.5	10.0	209.0	46.0	78.0
2004/05	3,013.0	2,357.0	633.5	330.5	110.9	191.5	10.0	98.0	93.5	111.5
2005/06	2,572.5	1,928.5	603.5	310.5	99.0	181.7	10.0	115.5	73.0	104.5
2006/07	2,767.0	2,031.0	662.0	351.0	124.8	185.8	12.8	175.0	45.0	91.0
2007/08	2,713.0	2,118.5	562.5	357.0	133.9	180.2	9.8	130.0	15.0	60.5
2008/09	2,669.5	1,939.0	608.5	376.5	153.4	176.9	11.0	142.0	31.0	59.0

Table 1 - Continuation

2009/10	2,973.5	2,224.5	653.0	444.0	196.5	195.1	12.0	97.0	29.5	82.5
2010/11	3,075.0	2,209.0	695.5	481.0	196.2	223.5	13.0	108.0	12.0	94.5
2011/12T	3,408.5	2,444.0	767.0	509.0	205.9	232.1	15.0	140.0	20.0	98.0
2012/13	2,718.0	1,739.0	844.0	542.0	240.0	232.1	16.0	160.0	30.0	112.0
Average (90/91-95/96)	1,804.2	1,373.1	323.6	168.6	56.3	91.4	9.1	112.8	18.2	24.1
Average (96/97-99/00)	2,459.4	1,864.1	448.9	238.5	73.6	140.3	6.7	129.8	44.5	36.1
Average (00/01-05/06)	2,774.3	2,180.0	545.7	315.8	105.3	181.1	10.8	96.6	67.8	65.6
Average (06/07-11/12)	2,934.4	2,161.0	658.1	419.8	168.5	198.9	12.3	132.0	25.4	80.9
Average (90/91 12/13)	2,505.8	1,890.4	513.2	300.9	109.3	157.5	10.3	118.6	38.1	55.7
Coefficient of variation	20.2	21.0	31.3	38.5	50.7	31.2	29.6	39.9	73.7	61.9
Trend parameter	68.5	49.1	20.8	15.6	3.0	0.8	0.4	0.4	0.8	3.1
Annual groivth rate (%)	2.7	2.6	4.0	5.2	2.7	0.5	3.9	0.3	2.0	5.5

Source: Olive Oil Council (www.internationaloliveoil.org).

Among the other producing countries, historical data statistics show that Turkey is also an important actor on the global olive oil market but with strong fluctuations in relation to production volumes. In recent years, Syria has also become an important player. Its olive oil production is slightly below than that of Tunisia. However, its presence in the export market of olive oil is extremely limited (Brillante *et al.*, 2007). There are other emerging producers such as Morocco, Jordan, South Africa, Australia, New Zealand, Iran, etc. but their presence in the global market is not comparable to those of the EU and Tunisia (IOC, 2013).

Consumption follows a similar pattern. The EU is undoubtedly the leader with its overall consumption accounting for over two thirds of global consumption. Within the EU, Spain Italy and Greece account for over 80% of EU consumption. As for the so-called third countries i.e., the countries that have recently emerged through IOC promotional campaigns, namely the USA, Canada, Australia, Brazil, Japan and China, their combined consumption is of about 450 thousand metric tonnes, of which 300 thousand metric tonnes for the United States (European Commission, 2012; IOC, 2013).

Production-consumption of olive oil

The International Olive Council regularly provides statistical data on the production of olive-producing countries. On the other hand, data on olive oil consumption are estimated by deducing from production, the addition of recorded imports to production, minus the recorded exports and the net changes in stock estimates. This is called apparent consumption[7].

IOC statistics suggest that apparent olive oil consumption trends follow those of production. The high olive oil production observed in some years are usually followed by a decline in prices, which in turn induces a delayed increase in consumption. The ranking of the major players on the world olive oil market depends on the variable considered (with the exception of the EU that remains a major player regardless of the variable). For example, Tunisia is an important player in terms of production and exports but not in terms of consumption. This is due to the fact that its policy has always been to subsidise alternative imported vegetable oils to promote exports of its domestic olive oil. These different national configurations are detailed in Table 2.

Within the EU, olive oil is mainly produced in small and medium farms. Some technologies remain inaccessible for smaller farms and on slopes steeper than 15 degrees. In these farms, the lack of mechanisation substantially increases labour costs. The costs imposed by eco-conditionality also tend to increase production costs in the EU. One way to reduce production costs is to achieve higher productivity and regular yields, by using for example genetic innovations and improved production techniques. Some studies indicate that there is a considerable margin for cost reduction through increased technical efficiency in organic and conventional

7 - This consumtion may differ from actual consumption. In a country like Tunisia where surveys with households on consumption of different commodities are regularly conducted, the statistics reveal that the apparent consumption levels systematically underestimate the actual consumption of olive oil.

Table 2 - Comparative importance of countries in the olive oil market (average 2006/07-2011/12)

Countries	Area (10^3 ha)	Production (10^3 tonnes)	Consumption (10^3 tonnes)	Exports (10^3 tonnes)
European Union	5,000	2,161.0	1,876.1	419.7
Tunisia	1,850	156.7	36.0	132.0
Turkey	800	144.2	110.7	25.4
Morocco	950	105.8	80.0	12.0
Syria	700	152.0	114.4	23.5
Jordan	135	26.1	24.5	1.6
Argentina	100	22.3	5.3	17.0
Other	465	166.3	679.3	36.8
Total	10,000	2,934.4	2,926.3	669.5

Source: Olive Oil Council (www.internationaloil.org).

farms (Tzouvelekas *et al.*, 2001). The available data do not allow to compare olive production in the EU with its main competitors. However, the high protection level of the EU olive oil industry show that in many olive growing holdings, the production costs are currently higher than in other producing countries.

Furthermore, despite the modernisation of the producing and processing industries, the fragmentation of the holdings, the structural duality in the processing industry, high labour costs and the relatively low vertical integration in many cases still lead to high transaction costs. In several EU regions, the olive oil processing industry has excess capacity. While technological advances in the production and processing industries have helped to improve the average product quality, only few innovations have been introduced in terms of management and organisation. The olive oil sector in the EU still has a number of weaknesses, particularly in trade and logistics (Mili and Rodríguez-Zúñiga, 2005).

Trade of olive oil in Mediterranean countries

Transportation and handling of olive oil in Mediterranean countries is quite variable depending on whether one is on the northern shore or on the southern shore. The difference lies in the amounts invested by farmer and industries in the transport of olives and oil extraction.

In the European producing countries, namely Spain, Italy, Greece, and to a certain extent France, olive oil extraction and blending are quite developed, especially in large-scale farms. Small farms are mainly grouped within organisation

such as cooperatives. According to the available data, only 5% in Italy but 70%, 60%, and 30% of farmers in Spain, Greece and Portugal respectively are members of cooperatives (Migdalas *et al.*, 2004; Bijman *et al.*, 2012). The trade of olive oil within the EU takes various forms. Internationally, olive oil can be sold in bulk to be blended, packaged and labeled in the country of destination. Trade outside southern Mediterranean countries, taking place in bulk with the exception of some localised initiatives where some of the blending is done *in-situ* (Gómez-Mejía *et al.*, 2007).

The increasing international traffic also has an impact on the international olive oil system (Gattuso, 2008). The main markets for European exports are those of less distant countries such as Switzerland, Norway and Russia, but exports of quality olive oil to Japan, China, USA, Canada, and Brazil are also increasing (Mili and Mahlau, 2005). There are considerable development opportunities for the Mediterranean olive oil sector, both in terms of mutual trade and in terms of intercontinental trade. However, any effort to improve the quality and to increase exports risk to be in vain without an adequate logistics policy (Ward *et al.*, 2003).

The management of the supply chain in the olive oil industry is strongly influenced by the exchange of information. Main distributors constantly monitor what consumers buy and how they behave in order to become more efficient and competitive on the market. Computers and communication systems are increasingly used to follow the movements of olive oil in order to guarantee safety and quality. Bar codes, Radio Frequency Identifications (RFIDs) and mobile phones are some examples, as well as robot applications for the management of processing and control, handling and transport of olive oil. Yet, good logistics also imply the organisation of efficient trade network, which means improving port facilities, prioritising multimodal hubs, optimization of marine services and overall network of productivity (Garcia *et al.*, 2012).

Transport and logistics can be driving forces, but even in this case, it is necessary to improve "Mediterranean networks". In other words, in order to reach the great Euro-Mediterranean markets and those of other developing regions, port systems and the relationship between Mediterranean countries should be considered. The development of logistics, the expansion of networks, the existence of competitive commercial ports connected with their logistic chains and connected to the whole territory, are among the priorities. The development of the southern shore is fundamental for a steady and sustainable growth of the European economies. Being such a vast and densely populated area, with a low income per capita, the Mediterranean has a high growth potential. This is also true thanks to the many resources available, especially human resources that are an asset in the olive oil sector.

Box 1: Socio-economic impact of olive oil in Mediterranean countries

The importance of olive oil production and marketing varies from one producing country to another but also within each country. Olive growing is confined to marginal and sometimes stony and sloped landscapes, dry to semi-dry climatic conditions and limited size farms (Loumou and Giourga, 2003). Table 3 depicts the extent of marginal lands covered by olive groves in the most important producing countries, the EU and Tunisia. According to Eurostat and the Tunisian Ministry of Agriculture, the share of disadvantaged land used for olive growing is close to 50% in Spain and Italy, reaches 70% in Greece and almost 90% in Portugal and Tunisia.

Table 3 - Share of disadvantaged land used for olive growing

Countries	Spain	Italy	Greece	Portugal	Tunisia
Share of disadvantaged land used for olive growing (%)	51	51	71	88	90

Source: Eurostat for EU countries and Ministry of Agriculture data for Tunisia.

In these areas, olive growing plays a major social and environmental role given the high numbers and percentages of farms that belong to such categories. Farmers try to make use of improved technologies in order to reduce production costs and maximise the product value (Francia Martinez *et al.*, 2006). According to Eurostat, there are about 1.9 million farms in the EU totally or partially dedicated to olive growing. One fourth of these farms are in Spain, covering half the total surface area, but with large fragments of small-scale farming, particularly in the other olive oil producing countries, as shown in Table 4.

Table 4 - Olive farm structure in the olive oil producing countries

Countries	Number of farms (10^3)	Area (10^3 ha)	Average size (ha)
Spain	423	2,500	5.9
Italy	776	1,300	1.7
Greece	513	1,100	2.1
Other	188	100	0.53
Total	1,900	5,000	2.6

Source: Eurostat.

Emerging markets

Olive oil is increasingly consumed by countries that discovered it only recently, primarily through generic promotional campaigns that were carried out by the IOC from the mid-80s to the early 2000 (Mili, 2006). When these campaigns started, the consumption of the United States did not amount to more that 40 thousand metric tonnes of olive oil which was mainly of unknown quality and origin (Datamonitor,

2010). In 2012, its imports exceeded 290 thousand metric tonnes that are generally of top or good quality. Table 5 below presents the major emerging markets for olive oil with the average imports over the period 2006/07-2011/12, along with the respective maximum quantities that were imported during some years that can be used as an indicator of the potential.

Table 5 - Major importers of olive oil (period 2006/07-2011/12)

Countries	Imports (metric tonnes)	
	Average	Maximum reached
European Union	121.6	224.0
USA	262.8	294.0
Brazil	49.4	68.0
Canada	34.5	40.0
Australia	32.6	41.5
Japan	34.6	42.0
China	24.9	40
Other	113.3	173.5
Total	673.7	923*

* In reality this total has not been reached yet. The amount corresponds to the sum obtained if all countries reached their maxima at the same time.

Source: Olive Oil Council (www.internationaloil.org).

Even though the registered 121 thousand metric tonnes of olive oil imports do not include the near one million metric tonnes of intra-community olive oil trade flows, the EU stands as a major player in the external olive oil market regarding its trade with other Mediterranean countries and particularly Tunisia. Part of the EU trade with Tunisia is for European consumption, but most of it is submitted to inward processing arrangements that consist of placing the quantities imported under suspensive admission for further refining and processing before redirecting them towards other market destinations. Note also the rapid growth of interest in China and Brazil for the consumption of olive oil. The consumption of other countries such as Australia and Canada seems to have stabilised, even though the former is also interested in the production of olive oil.

Particular attention should also be given to China, which could be an attractive market for the Mediterranean olive oil industry. The size of its population, changes in consumption habits resulting from rising living standards, the opening up of the economy to international trade, the opportunity of its inhabitants to travel, as well as the taste that Chinese have recently developed for olive oil, make this country a market with huge increase potential and a trading area of considerable importance

to the international olive oil market. Olive oil is increasingly appreciated by the Chinese. Its nutritional and health properties (protection against diabetes, coronary and cardio-vascular diseases, cancer and osteoporosis, for example) make it increasingly appreciated by a population with high purchasing power, whether for personal consumption (60%) or as a gift (40%). Quality and brand are decisive factors to attract wealthy clientele.

The use of olive oil remains little known in China: vegetable oil is only used for cooking and olive oil therefore fails to satisfy consumer requirements. Supermarkets only began selling it since the late 2000 and only in a few large cities (90% of the quantity imported is sold in Shanghai, Guangzhou and Tianjin). The consumers who know its virtues are not yet able to distinguish the different qualities of oil and require regulatory labelling that allow a clear indication of the quality, country, terroir and designation of origin. In the shops, blended olive oils are found next to virgin or extra virgin varieties. The expiry date is modified when the oil is transferred to small containers. Moreover, the indication "olive-pomace oil" (a by-product of the extraction process composed of olive skins, pulp residues and fragments) is never used in the Chinese market and experts fear that this type of oil is being repackaged as regular olive oil.

Mediterranean countries are the leaders of the Chinese market: Spain (supplying 40% of Chinese imports), Italy (30%) and Greece (20%) followed by Turkey, Tunisia and France. However, the Mediterranean countries will need more than a quality product if they want to enter the Chinese mass market, especially that Australia is becoming a serious competitor in the high-end market. Substantial public relations will be necessary to raise awareness on the benefits of Mediterranean olive oil in China, to attract the attention of importers and arouse the curiosity of the Chinese looking for new products (Lazzeri, 2011).

Russia is another emerging market for olive oil. In 2008, Russian olive oil imports hardly amounted to 18,000 tonnes; palm oil was top among vegetable oils with 692,000 tonnes, followed by coconut oil with 192,000 tonnes. Russia cannot be considered as an untapped market for olive oil since more than 100 brands of olive oils are already available in supermarkets and deli shops. However, with a population of about 140 million, and given the huge amounts of vegetable oils that they consume, the margin development is significant if the aim is to replace other vegetable oils and make olive oil the preferred choice for consumers. And if the per capita income has seriously declined in 2009, falling to 8,616 dollars due to the global financial crisis, it quickly rebounded, reaching 13,089 dollars in 2011, according to the World Bank. Russian consumers clearly have more purchasing power to afford more expensive and healthier vegetable oils, like olive oil.

The simplification of import processes and procedures could help promote more actively olive oil from the EU. This would mean that Russia must make a fundamental step in deregulating its business environment and improving its ranking in the "Doing Business" index where it currently occupies the 120th position. This does not make it very attractive to foreign companies. Given that Russia and the EU already have strong trade links and that the tariffs will be reduced and procedures

simplified and streamlined to fight against persistent bureaucracy, European olive oil exporters should be interested in the East.

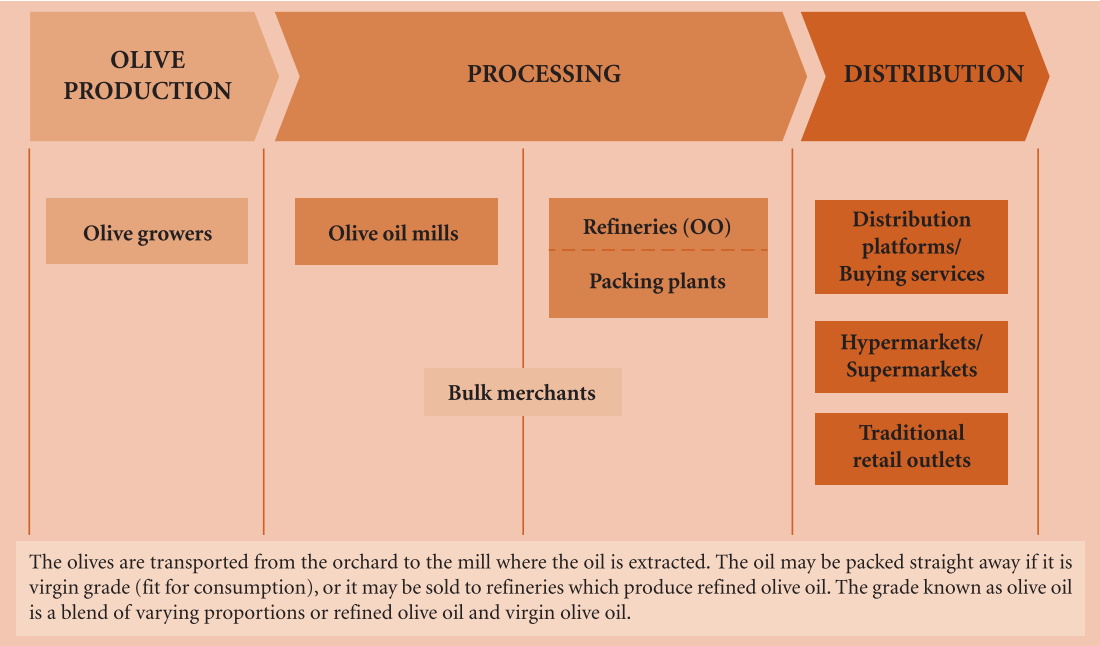
Logistics and the marketing chain

The olive oil supply chain is basically made up of three stages: (i) the harvesting of olives in olive groves, mostly operated by small and medium producers and some large-scale farmers, (ii) the transportation of the harvested olives to the mills where they are pressed (iii) the distribution or sale of olive oil to retailers, supermarkets and retail chains, depending on the country (Ahumada and Villalobos, 2009).

Route of the product from harvest to consumption

The value chain of olive oil which is shown in Figure 1 below consists of the following stages: a) olive oil production (small, medium, or large farms), b) processing (mills, refineries, wholesalers) and c) distribution (small retailers, restaurants, supermarkets and retail chains).

Figure 1 - The olive oil value chain

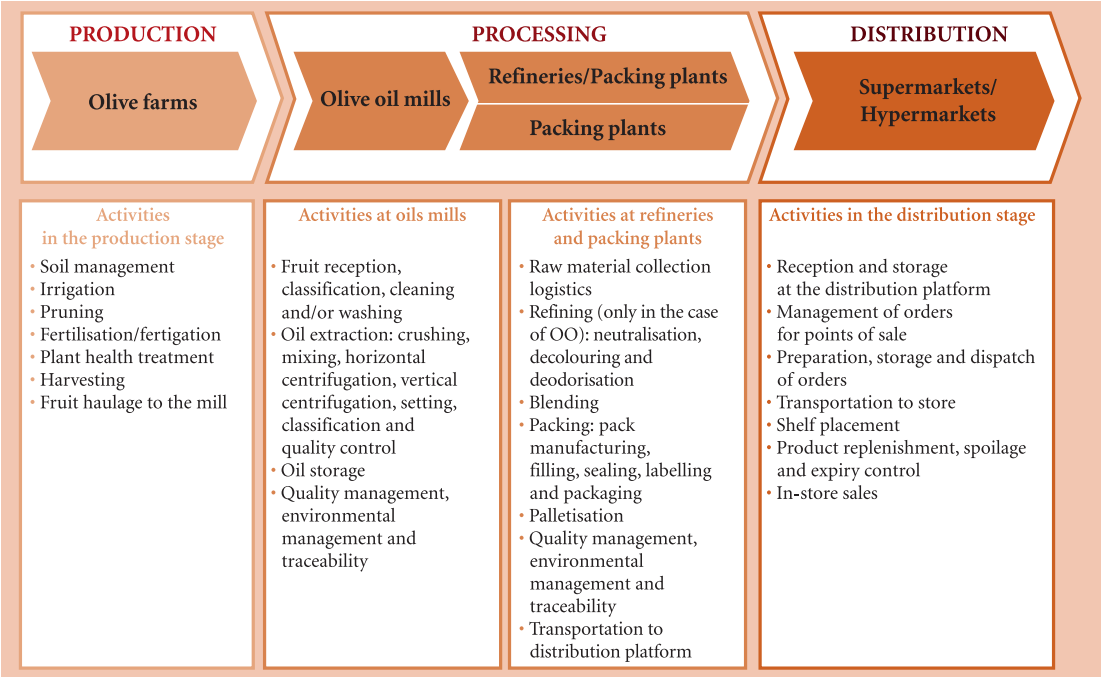


Source: International Olive Oil, *The Value Chain and Price Formation in the Spanish Olive Oil Industry*, 2010 (www.internationaloliveoil.org).

The harvested olives are transported from the olive grove to the mill where oil is extracted. The virgin oil can be packed immediately after extraction or sold to refineries, which produce refined oil. The time between harvesting and pressing, the conditions of their transport from the groves to the mill, the quality and level of maintenance of the equipment used for extraction, determine the quality of the finished product. If northern European countries control these factors, the same cannot be said for olive oil extraction in southern Mediterranean countries, with some increasing exceptions of course. This is why most of the olive oil coming out

of these countries is generally in bulk form (over 90%) as blending requires investments that most farms cannot afford (Dekhili *et al.*, 2011). Figure 2 illustrates each stage of the olive oil value chain.

Figure 2 - Activities per stage in the olive oil chain



Source: International Olive Oil, *The Value Chain and Price Formation in the Spanish Olive Oil Industry*, 2010 (www.internationaloliveoil.org).

Promotion

In many EU regions, the leading olive oil companies and public institutions have spent substantial financial resources for brand and generic promotion in order to raise public awareness, to develop a positive perception among consumers and to stimulate the demand (Mili, 2006). In Spain in 2004, companies of the sector spent 12.5 million Euros for olive oil advertising (Antelo, 2006). Companies, especially in Italy, which retain traditional extraction methods in preference to the more efficient systems (2-phase centrifugation) put forward this specificity in their communication to the attention of consumers, emphasizing the link with local history and culture. Many consumers prefer oils obtained by this procedure (Capogna *et al.*, 2001).

Within the EU, the coordination of promotion activities can still be significantly improved. The introduction of a generic "EU" designation for external markets could improve the efficiency of promotional campaigns of EU olive oils in emerging markets. In such campaigns, which are aimed at countries where olive oil is not traditionally consumed, better provide potential consumers with simple and clear information on the product and its uses.

Strategy of distributor brands

Regular collaborations between companies producing olive oil in the EU and some large food distribution chains are increasing. In Spain, for example, the companies "Sovena" and "Olilan" have specialised in the production of olive oils in partnership with distributor brands. In Spain, distributor brands account for almost 50% of the olive oil market, in Portugal 23% and in Italy 11% (Mili and Mahlau, 2005). In the UK, most consumers buy olive oil under a distributor brand, as brand loyalty is low and many products are perceived as interchangeable (García Martínez *et al.*, 2002).

Investments in transport and logistics have a strong impact on the level of flexibility and reactivity of the Euro-Mediterranean industrial chains. In recent years, many efforts have been made to liberalise the market, better regulate the transport sector and construct adequate infrastructure (deep water ports, highways, logistics platforms, etc.). All Mediterranean countries have initiated plans to modernise infrastructure in addition to the implementation of a large number of national or international programmes specifically designed to improve logistics performance (2010-2015 logistics contract-programme in Morocco, Logismed Programme of the European Investment Bank, etc.). Consequently partnership announcements have increased significantly since 2010 in the south and east of the Mediterranean, particularly in terms of air and maritime transportation, as well as logistics.

Nevertheless, in the Mediterranean region, overall logistics costs are still relatively high (20% on average for the Maghreb, against 15-17% for emerging countries including Turkey and 10% in Europe and the USA). Storage infrastructure and logistics platforms require investment, the freight transportation market remains fragmented (and dominated by the informal sector), rail networks are obsolete and the region lacks intermodal operators. Operators that specialise in training, logistics consulting and development of information systems (to optimise the flow of goods, online management, simple procedures related to export/import, etc.) would also have great opportunities.

Weaknesses in the strategic marketing of the product

The EU olive oil sector has long responded to supply criteria rather than policies to promote demand and to capture new markets (Mili, 1999). Until recently, effective export strategies with a medium and long-term vision were rare. In addition to brand promotion, it is necessary to engage in joint and coordinated promotion and advertising activities in foreign markets. Generic promotion is traditionally made by the IOOC with the financial support of the EU. In the last years, several generic promotion programs have emerged within the EU and in some emerging markets outside the EU (European Commission, 2006). New technologies have brought about new opportunities in the field. Their use for national and international trade is an opportunity for operators in the sector if olive oil in the EU. It allows producers to provide consumers in many countries with detailed information about the characteristics of their products: origin, varieties used, organoleptic and sensory properties, potential uses, etc.

Competition from cheaper vegetable oils

To some extent, olive oil competes with sunflower oil, soybean oil, rapeseed oil and other substitute oils and fats. Soybean oil is the most consumed oil worldwide (30% of the world consumption of vegetable oils). Each oil has its own characteristics and may not be suitable for all types of use. When the consumer looks for specific characteristics for specific uses, substitution effects are limited. However, whenever substitution is possible, the price can be an important determining factor for market share (Owen *et al.*, 1996).

Difficulties hindering the development of production

The main difficulty is the strong competition from other edible oils and fats around the world. This competition has two aspects. Firstly the price differential in favour of other oils does not promote the consumption of olive oil, even though it is gradually declining. Secondly, most consumers, including the traditional consumers of olive oil, think that can be easily substituted. Hence, the nutritional and culinary values of olive oil (IOC, 2013) are not sufficiently widespread to raise awareness among consumers on the fact that oils are different and not substitutable. Pressed olive oil, which is a pure juice containing antioxidants, is not nutritionally comparable to other chemically refined vegetable oils. That is why the price differences only are not enough to compare products. This is a major handicap for olive oil regardless of its origin (Matsatsinis *et al.*, 2007).

The second handicap of olive oil is that it is not sufficiently known outside the Mediterranean region from where it originates. In many parts of the world, olive oil is still unknown, even in the United States where the annual imports nearly reach 300 thousand metric tonnes, i.e. about one kilogram of consumption per person per year. This consumption is certainly not comparable to that of the mid-1980s when Americans consumed only about 40 grams of olive oil per year per person. However, given the average standard of living and education, there lies a tremendous potential. In other countries, similar potentials can be also identified (Dekhili *et al.*, 2011).

In terms of supply, since olive oil comes mostly from areas with adverse agro-climatic conditions, the olive yields are generally low, hence the high cost of production. The olive harvest in particular, requires a large workforce whose wages weigh on the production costs. Other costs related to transportation and milling also contribute to the increase in costs. In terms of demand, prices are largely determined by the competition that leads to cost/price cutting and requires public policies to maintain a balance in the market (Türkekul *et al.*, 2007).

The irregularity of production from one year to another is another typical constraint of olive cultivation. This has serious consequences on the income of farmers, particularly small farmers and entrepreneurs that constitute the majority of olive growers (Anania and D'Andrea, 2007) as well as on customer loyalty and the regularity of economic activities.

Other constraints affecting the sector include the existence of small farmers and entrepreneurs working individually. The data available in olive oil producing

countries clearly show that the key to success lies in the economies of scale and size made possible by cooperation. Unless and until the spirit of cooperation is adopted and generalised, the cost of production of olive oil will continue to be high and the relative market power of individual entrepreneurs will remain limited.

How to overcome the difficulties

The above-mentioned difficulties are structural and it will take time to overcome them in a satisfactory way. Some of the solutions may arise from the use of relevant agricultural techniques and technologies to better manage the ever-increasing costs of production while reducing the output gap. For example, pruning techniques could contribute to this objective. Many of the solutions lie in better organisation of culture and management to achieve economies of scale and size. The example of Spain and the role played by cooperatives in all phases of the olive oil production is an example to follow. Communication technologies can also help reduce the costs of marketing, trade and supply of input associated with this sector.

Issues related to packaging, labelling and distribution

One way to develop the economy of olive oil is to invest in product blending in general, adequate packaging, appropriate labelling or efficient distributional channels. Whatever the variety and quality, olive oil should be packaged in the darkest possible glass as it is the best way to protect and preserve it in the best conditions. However, this type of packaging is too costly for lower quality oils, as the market could not bear the final product cost.

In recent times, metal packaging or of Tetra-Brik type are gaining ground as these containers provide effective protection from ultraviolet light and in terms of cost, they are less pricy than glass containers. When the aim is to enhance the oil itself (content) while minimising the cost of packaging, the best option is PET (polyethylene terephthalate). Even though it does not have the same qualities as glass, it complies with sanitary requirements.

However, the glass container should be considered as the best option, as it has the largest number of advantages in terms of cleanliness, protection, conservation, presentation and usability. The consumer is much more attracted to well presented and labelled commodities. The more educated the consumer is, the more sensitive he is to the information provided on the product's label. Commodities presented in a bulky way or presented in a non-original way are unlikely to encourage the purchase of such products (Dekhili and D'Hauteville, 2009). A label usually gives five pieces of information: content, quantity, brand, customer service contact and nutritional information. The label generally features two different fields. The first and most important one is what consumers see first when purchasing the product.

Here we find: the identity elements of the product, its name, based on its certified quality (for example, extra virgin olive oil) as well as production processes (organic production in accordance with the regulations for example), indication of the quantity i.e. the net volume of the product's content in both metric (grams, kilograms, millilitres, litres) and customary (litres, ounces, pounds) system terms.

The second one is composed of the following information: the name and address of the manufacturer, packager or distributor, the list of ingredients, nutrition information.

In recent years, it is common to find mention of the product's health benefits, especially in countries with developed economies, where consumers with higher incomes give greater importance to a healthy lifestyle. We find formulas such as "reduces the risk of cancer" or "reduces the risk of heart disease". Producing countries are showing great ingenuity to further diversify the blends of olive oil as can be seen in specialised fairs that are regularly held in these countries. However, there is more to be done in terms of blending to strengthen consumer demand. The consumers should also be able to check some important information about the quality of the product, such as commercial category and origin.

Box 2: Value chain and price formation in the Spanish olive oil sector

Spain is the world leading olive-oil export country. Almost 80% of the total exported volume is sold to EU countries. Total imports of olive oil accounted for 59,700 tonnes in the 2007-2008-crop year. Imports from EU countries represented 35%, among which Italy stands out with 14% of the total 2008-2009-crop year. The olive oil value chain has three distinct stages involving different agents with a high degree of specialization. The olives produced in the groves are transported to mills for the extraction of virgin olive oil. There, it can be bottled directly if it belongs to the pure category (fit for consumption), or it can be sold to the refineries for the production of refined olive oil.

Olive growers are farmers, who either work individually or are part of an association, cooperative or agricultural processing firm (SAT), that grow, harvest and transport the olives to the mills where they are pressed. In Spain, there are both traditional and extensive cultivation farms (the most numerous) or intensive and super intensive farms. The first model is predominant in regions where olive growing has a long tradition, most often a rainfed crop. The planting density is between 80-120 trees/ha (with one or several branches) and, depending on the possibility of mechanisation of the harvest, we can distinguish between mechanised and traditional non-mechanised olive groves. The latter generally incur high costs.

Regarding the size of olive groves for oil production in Spain, 54% corresponds to farms of less than 5 hectares, ranging from an average of 0.12 and 2 hectares according to the Autonomous Community. The number of working oil mills in the 2007-08 seasons was of 1,732, distributed among 13 Autonomous Communities. Andalusia hosts the largest percentage (45%), followed by Castilla-La Mancha and Catalonia. The most frequent mill size is the one that presses between 20 and 100 tonnes of oil produced per crop year (23% of the total). The mills distribute the oil through two main channels, consumption by the farmers themselves (virgin and extra virgin), and the sale of bulk oil to refineries (not refined), bottled (virgin and extra virgin) and to the wholesalers. Some mills have extra virgin olive oil bottling lines and focus their production on local consumption and short-chain markets. Likewise, the modern distribution channels are the main marketing channels both for extra virgin olive oil and olive oil (86% of olive and extra virgin olive oils consumed are bought through these channels). Therefore, the analysis of costs and prices focuses on the modern configuration of the value chain of both products (Herrero Velasko, 2011).

An olive oil business in Crete

Terra Creta is a Cretan company whose export volume is important. Located in the region of protected designation Kolymvari near Chania in western Crete, the estate provides a quarter of the production of olive oil from Crete and the rest comes from about 800 local farmers, each with 500-2000 trees aged about of 80 years spread over 4-10 groves. Harvesting is done primarily through vibrating rakes and fruits that cannot all be processed at once so the trees are strategically pruned to stagger ripening. This delicate balance – heavy pruning improves quality but reduces quantity. It is achieved through the control of many microclimates found on this mountainous island of 8,400 km^2. Near-infrared spectroscopy (NIRS) tests of fruit development (fruit moisture, olive oil content and acidity level) are used to determine the ideal time to harvest each grove.

Terra Creta aims to be traditional in cultivation and harvesting but modern in extraction. Representative samples of each farmer's delivery are collected at the first stage of processing, where leaves and twigs are separated from the olives, and analysed on-site within a minute via NIRS. The results determine to which of Terra Creta's three main settling silos they will be transported. Resulting from a two years' research, this classification system is crucial for the new high line quality of extra virgin oil with a maximum acidity of 0.2 that Terra Creta launched in 2013. It is also a measure that encourages farmers to try to achieve the best quality oil that does not exceed 0.2% acidity by giving them a bonus of 0.05-0.10/kg. In 2013, the average acidity of all oil extracted in mills was 0.4%. The limit for extra virgin oil is 0.8%. The company says that all its production was sold with the exception of a part that it keeps each year to blend with the new oil extracted during the first month of harvest. The company also adapts its oil blend according to the tastes of the market. "Our customers in the US consume milder olive oil than those in Germany and these preferences should be taken into account if we want to succeed." The company exports oil packaged in glass bottles to distant countries such as China and Australia but breakage is rare. When this occurs, it is usually during transport and due to temperatures below zero as in Belgium and Scandinavia. Italian bottles are preferred, because "their quality is better than the Greek ones." Tins are also used, but mainly for the French market and the catering sector. Terra Creta says its oil has an 18-24 month shelf life. An extra virgin olive oil with real olives inside the bottle has been exported to Brazil and will soon be sold elsewhere, including the US. In 2014, the company plans to diversify by producing table olives and olive paste and creating a range of corporate gift boxes. Providing 23% of Terra Creta's total sales, Belgium is its largest foreign market, followed by the US, accounting for 15%, "the most difficult" market, according to the company's directors.

Terra Creta recorded strong growth in China and in Russia. Those markets account for 7% and 12% respectively of its sales, Brazil for about 10% and Canada for about 8%. Terra Creta opted for integrated farming practices and with nearly a fifth of its production already organic, it aims to become Crete's largest organic producer. Bottling on site not only added value, but it also created work for labelling, freight and other companies.

Focus on some countries

Tunisia

With a production initially intended for exports, the Tunisian olive oil industry is a special case. The country exports more than 130 thousand tonnes per year on an average total production of about 160 thousand tonnes. Taking advantage of a grant program established by the state, vegetable oil imports developed in the country and began to offer affordable oil commodities that have practically replaced olive oil in the eating habits of Tunisians. The imported vegetable oil has benefited from advertising campaigns that not only highlighted its value and versatility but also denounced olive oil as a possible cause of cholesterol problems.

It is estimated that about 300 thousand farmers in Tunisia are partially or totally dependent on the sector of olive cultivation to live, i.e. more than 10% of the population. 97% of the olive groves and 91% of the trees are grown under rain-fed conditions. Furthermore, there are about 1,800 olive oil mills in Tunisia, slightly more than in Spain whose production is 5-10 times higher, depending on the year. In other words, pressing capacity is higher than the actual need and this creates artificial competition among processing units for short periods of time, which increases production costs.

Despite that it has been an olive oil exporter for a long time, Tunisia is a price taker because of the preponderance of its exports to the EU, primarily in the framework of the inward processing procedure. In the 1980s, Tunisia also concluded an agreement with the EU on a duty-free quota of 56,000 tonnes, but marketable over a number of months and not exceeding 10,000 tonnes per month. Unfortunately, this quota is not reached due to the rigidity of the procedures applied on both shores of the Mediterranean. Special incentives were recently offered to exporters to enable them to invest in packaging and branding with special funds from the bulk export revenues. In 2013, more than fifty brand of Tunisian olive oil were exported to many countries, especially the United States and the Gulf countries. However, these exports do not represent more than 6-7% of total exports.

Joint ventures with European olive oil manufacturers are now developing. These allow Tunisian producers to place large quantities of olive oil on world markets but without significant added value. While sharing most properties of olive oil coming from other countries, Tunisian olive oil has a unique characteristic: it not exposed to the intensification of inputs since over 90% of the olive trees are grown under rain-fed conditions without any kind of intensification. This does not necessarily qualify it as organic, but it makes very close to the concept. However, Tunisian olive oil, like other olive oils, suffers from a lack of visibility not only worldwide, but also at national level.

Libya

Libya is turning to olive oil – the green gold of the Mediterranean – to compete with its North African neighbours, conquer European markets and diversify its

economy that is too dependent on hydrocarbons[8]. Libya has decided to promote the quality of its olive production to make its olive oil more competitive and increase exports to Europe, according to the Export Promotion Centre in Tripoli. The new strategy of the Centre involves all stakeholders in the olive oil production chain, particularly the private sector, to boost productivity and conquer foreign markets.

Libya ranks as the world's 12th largest olive oil producer with 0.25% of world production, according to the FAO. It is far behind its neighbours, namely Morocco (4th, 10.6%), Tunisia (6th, 4.4%) and Algeria (8th, 1.7%). It has 8 million olive trees and produces 160,000 tonnes of olives that give 32,000 tonnes of oil, according to figures provided by the country's Ministry of Agriculture. A desert country with an area of 1.76 million square kilometres, Libya has 3.6 million hectares of arable land, just 2% of the total area of the country. However, the olive tree, easily accommodates to periods of drought and is perfectly adapted for the Libyan arid climate.

The country is currently testing a new type of olive imported from Spain, the Arbequina, which is famous for its highly aromatic quality. Introduced in Europe in the seventeenth century, this variety is mostly grown in Catalonia. The new strategy also focuses on improving the packaging of finished products to make them more attractive. The new Libyan authorities plan to create a recognisable national brand to facilitate marketing while establishing a relationship of trust with consumers. They thus seek to break with the policies of the Gaddafi regime, during which bureaucracy prevented the promotion of all exports other than hydrocarbons. Until now, the export of olive oil was done at the initiative of only a few individual farmers and owners of olive presses. The state intends to become more involved in the support of the entire production chain, from the choice of varieties to plant to processing and packaging. The Centre will also conduct studies on the European market and ensure the collection of data necessary for Libyan exporters to help them penetrate these markets.

Italy

Based on the feedback collected by the International Olive Council in marketing studies in some of the new consumer countries of olive oil (the United States for example), olive oil was considered as an exclusively Italian product due to the pioneering and prospective work done by Italian merchants during decades. Although in many cases the Italian industry was just processing olive oil produced by other countries such as Spain or Tunisia, Italian companies, both in Italy and in foreign markets, have contributed to the expansion of the olive oil market and its image. So much so that until the early 2000s it was estimated that over 65% of the world olive oil trade was made by Italians, although Spain was already producing over a million tonnes, i.e. twice or three times more than Italy according to different sources. Italian traders of olive oil were mainly present in the United States because of the large Italian community in this country, particularly in the restaurant industry that grew significantly from the 1960s to the 1990s.

8 - "Libyan government eyes olive oil, not crude oil, for recovery", *Hurriyet Daily New*, December 10th, 2012.

In the 2000s, Spanish companies have acquired large Italian companies. Today, without doubt, Spain is taking the lead over Italy due to its particularly high production (over 1.4 million metric tonnes) that places it as a leading world market but also in terms of trade. In terms of quality and diversification, the practice of early harvest olives and olive oil extraction from the beginning of October or even at the end of September, and labelling on a weekly basis for the corresponding month, the country is innovative and highly effective in increasing the value of the product.

Syria

Syria is one of the major producing countries of olive oil in the Mediterranean region, particularly in terms of areas devoted to olive plantations and number of trees. From these two perspectives, Syria has a larger share than Turkey or Morocco. Syria is even ahead of Tunisia, the largest olive oil producer and exporter in terms of number of trees: 80 against 70 million trees covering an area that is about a third of the same area in Tunisia. Despite the belief that olive cultivation originated in this part of the world, olive growing is quite recent in Syria as 57% of farms exist since less than 20 years and 85% of the trees are less than 70 years old (Brillante *et al.*, 2007). In fact, the expansion of olive cultivation (doubling) in Syria occurred primarily from 1990-2005. The current average levels of olive oil production are comparable to those of Tunisia (150-160 thousand tonnes) but the international presence of the two countries on world markets is not comparable. While Tunisia has put more than 120 thousand tonnes of olive oil on the world market per year, Syria's contribution does not exceed 7,000 to 8,000 tonnes.

Olive oil consumption is as low as that of Tunisia, but the population is twice as large and most of the production is sold locally. In recent decades, agricultural policies have managed to place Syria among the top producers of olive oil in the world. However, the significant increase in olive oil production was largely absorbed by domestic consumption. The visits to Syria in the 2000s revealed that the technological knowhow to produce satisfactory olive oil that would meet international quality standard requirements was limited. Nobody knows to what extent the olive oil industrial infrastructure has been affected by the ongoing civil war in the country.

Even if the war ends quickly, it will probably take a lot of time to repair the olive oil industrial infrastructure. Furthermore, international observers are not certain that the large expansion in production resulted from a spontaneous investment linked to the prospect of profitability in the minds of Syrian farmers. It is probably due to the incentives provided by the State.

Therefore, the medium to long term prospects of the Syrian olive production is likely to stagnate, even if the planted olive trees continue to produce. Greater penetration of the world market would require the restoration of social stability, without which there can be no spontaneous investments or major investments in technological knowhow that could comply with the international quality standards.

Conclusion

Olive oil is one of the most important goods in the Mediterranean region. The analysis of difficulties related to trade and logistics should allow producers, distributors, consumers and policy makers to find ways to increase the exports, especially to emerging markets. The logistic coordination of transport of olives and olive oil in particular can be improved by the use of information technology and the effective reduction of distances and costs especially since most exports are done by sea.

The livelihoods of a large number (perhaps too many) of households depend on olive oil. Being more expensive to produce than other vegetable oils and fats, and subject to strong competition on the market, olive oil face more difficult challenges. Further development of the sector depends upon the research for ways to control its production costs while expanding its market both nationally and internationally. The expansion of olive oil consumption in the UK and Germany are examples to follow. Domestic markets of other EU countries, such as the northern olive oil producing countries, are also to be explored. However, the expansion of markets should especially be done outside producing countries. The generic promotional activities conducted in third countries in the past have given very promising results. They should be resumed and intensified. In addition, policy incoherencies such as those in Tunisia where the market has been diverted from olive oil should be revised.

We generally recommend that the support for the production of olive oil in EU countries should be devoted to the creation and development of the market in order to reduce the inefficiencies and steer the sector towards a social optimum.

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CHAPTER 12

TRADE AND LOGISTICS: THE CASE OF THE LIVESTOCK AND RUMINANTS MEAT CHAIN

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Ruminants farming is closely related to fodder production. Depending on agro-climatic conditions, this production is very unevenly distributed on territories. For a long time, this resulted in the trade of animal products between production zones and zones of demand. Urbanisation and the income growth of whole populations strata in emerging countries obviously lead to the intensification of trade.

As from the end of the nineteenth century, the control of cold allowed to extend the preservation and transport time of meat thus internationalising exchanges. Trade increased significantly due to the specialisation of certain regions on the one hand and the increasing demand in animal proteins related to demography and economical development on the other hand. Despite the price and the environmental cost issues of livestock productions, so far, the phenomenon of food transition towards a more meat-based diet seems to be spread across all continents. At the same time, for various reasons, especially political and cultural, and despite unfavourable conditions, some countries have tried to develop livestock farming or at least the slaughter sector. The improvement in local agricultural yields and grain trade allow animal feeding production units in zones that were formerly adverse, thus allowing the development of livestock in structurally meat importing countries. This leads to the need for live animals, whether for milk production, fattening or even direct slaughter.

Facilitated by logistics development, both meat and livestock trade increased and brought about new challenges. This chapter aims at describing the relations between trade and logistics in the livestock and ruminants' meats sector (bovine, ovine/caprine) in member countries of the CIHEAM[1].

1 - This chapter only concerns the thirteen member countries of the CIHEAM frequently referred to as "the zone" or "the region".

A region that generally imports meat and livestock

Table 1 presents a national balance sheet for bovine and ovine/caprine[2] trade for each of the studied countries. We chose to present figures in the form of averages for the three-year periods 2001-2003 and 2009-2011 (the last year available) in order to smoothen cyclical variations (the impacts of sanitary crises in particular) and possible artefacts but also to highlight the last decade's developments (percentages of annual growth presented in the Table). While reading these charts, we should keep in mind that with the exception of Spain for ovine meat only, all countries of the zone are net bovine and ovine meats importers. The Mediterranean is therefore an important outlet for exporters worldwide.

Levels of imports remain modest (lower than 10,000 t cwe a year[3]) for *bovine meat* in countries like Albania, Malta, Morocco or Tunisia, but they reach 45,000 t cwe a year in Lebanon, 60,000-70,000 in Algeria and Turkey and 250,000 in Egypt, while in France and Italy the level is the highest with respectively 350,000 and about 500,000 t cwe a year. The dependence on imports has generally increased during the last decade, in particular in Algeria, Egypt, Lebanon and Turkey but also in European Union (EU) countries such as Spain, France and Italy. Only three countries in the area are also exporting significant tonnages: Spain and Italy export around 150,000 t cwe a year each (decreasing in Spain and increasing in Italy) and France, a little less than 300,000 t cwe (increasing).

Ovine meat imports remain very limited in Albania and in southern Mediterranean countries without any significant evolution during the last decade. Spain, Greece and Portugal import around 10,000 t cwe a year (with a significant decline in Greece) and Italy 30,000, but France is by far the biggest importer of the zone with approximately 140,000 t cwe a year. Only two countries are exporting: France with approximately 10,000 t cwe a year (stable situation), and Spain whose exports have slightly increased over the period to exceed 25,000 t cwe a year.

France is the main *cattle* exporter with about 1.5 million heads a year, even if the trend is decreasing. All other countries are live cattle importers with extremely variable levels of imports. They range from 10,000 to 15,000 heads a year in Portugal and in Tunisia, from 30,000 to 40,000 in Albania, Algeria and Morocco, reaching 70,000 to 85,000 heads in Egypt and in Greece, then respectively 180,000, 250,000, 350,000 and 500,000 heads a year in France, Lebanon, Turkey and Spain, and up to about 1.5 million heads per year in Italy. If imports are decreasing, especially in Egypt and in Spain, there are strong growths in Albania, in the Maghreb and even more in Turkey, which opened its market only in autumn 2010.

2 - Generally speaking, we did not try to distinguish the ovine races from goats because in statistics, they are often mixed up. Unless otherwise specified, the term "ovine race" will thus refer to both species, the second always being a minority in trade exchanges. Besides, we based our analysis on two series of statistics: on the one hand, those provided by the FAO (http://faostat.fao.org/site/291/default.aspx) on local production, slaughtering and net production of meat, and on the other hand, the data provided by the International Trade Centre (ITC) (www.intracen.org/trade-support/trade-statistics) on international trade. The ITC database also provides access to customs statistics and to the six-digit list (SH6) as well as to information on the type of marketed product (livestock and meat).

3 - The balances of meat are calculated in tonnes carcass weight equivalent (t cwe). By convention, the tonnages of livestock are multiplied by 0,5 to be referred to in t cwe, the tonnages of bovine meat, boned or processed, by 1,3, etc. These conventions can vary from a country to another. Within the framework of this chapter, we used the official coefficients of the EU.

Table 1 - National balance of bovine/caprine channels in the member countries of the CIHEAM (averages 2001-2003 and 2009-20011 and annual growth)

	CIHEAM		Albania		Algeria		Egypt		Spain		France		Greece		Italy		Lebanon		Malta		Morocco		Portugal		Tunisia		Turkey	
Bovine species																												
Three-year average for the period 2001-2003 and 2008-2011																												
Domestic production ('000 heads)*	17,979	17,043	340	315	594	659	1,367	1,360	2,194	1,754	7,180	6,355	178	282	2,881	2,481	33	32	6	5	828	967	414	448	223	255	1,741	2,131
Live imports ('000 heads)**	2,611	3,026	5	39	4	37	120	69	558	503	133	178	89	85	1,480	1,463	208	247	0	1	0	28	15	11	0	14	0	351
Live exports ('000 heads)**	1,755	1,633	0	0	0	0	0	0	102	136	1,617	1,425	0	5	31	41	0	0	0	0	0	0	2	26	0	0	3	0
Net live trade (E-I, '000 heads)	-856	-1,394	-5	-39	-4	-37	-120	-69	-456	-367	1,483	1,247	-88	-80	-1,448	-1,422	-208	-247	0	-1	0	-28	-13	15	0	-14	2	-351
Slaugthers ('000 heads)*	18,867	18,214	351	365	598	690	1,509	1,436	2,669	2,308	5,687	5,126	285	337	4,267	3,734	245	312	6	5	828	985	423	421	263	269	1,736	2,225
Net production ('000 tcw)*	4,483.3	4,557.7	36.4	34.9	113.2	128.6	237.3	428.9	635.1	458.4	1,862.7	1,747.8	51.7	60.6	915	838.7	6.9	7	1.5	1.3	155	190.4	99.7	103.7	51.2	51	317.6	506.5
Meat imports ('000 tcw)**	1,142.9	1,737.1	3.7	6	32.9	69.5	139.2	245.1	99.8	154.2	262.9	385	105.8	114.2	386	534.6	18.4	44.9	8.6	6.7	6.5	8.4	77.7	106.3	0.6	3.5	0.7	58.7
Meat exports	513.3	600.1	0	0	0	0	0	0.4	147.9	135.3	234.8	288.6	1	2.6	128.8	164.6	0.2	2.2	0	0	0	0.1	0.3	5.7	0	0	0.1	0.5
Net méat trade (E-I, '000 tcw)**	-630	-1,137	-4	-6	-33	-70	-139	-245	48	-19	-28	-96	-105	-112	-257	-370	-18	-43	-9	-7	-7	-8	-77	-101	-1	-3	-1	-58
Availabilities (P+I-E, 000 tcw)	5,112.9	5,694.9	40	40.9	146.1	198.1	376.6	673.6	587	477.3	1,890.8	1,844.2	156.5	172.3	1,172.2	1,208.8	25.1	49.6	10.1	7.9	161.5	198.7	177.1	204.2	51.8	54.5	318.1	564.7

Table 1 - Continuation

	CIHEAM	Albania	Algeria	Egypt	Spain	France	Greece	Italy	Lebanon	Malta	Morocco	Portugal	Tunisia	Turkey
Annual percentages for the three-year periods between 2001-2003 and 2009-2011														
Domestic production	-0.7%	-0.9%	1.3%	-0.1%	-2.8%	-1.5%	5.9%	-1.9%	-0.5%	-1.2%	2%	1%	1.7%	2.6%
Live imports	1.9%	29.8%	33.3%	-6.6%	-1.3%	3.7%	-0.5%	-0.1%	2.2%	n.a.	117.2%	-3.8%	113.1%	144.2%
Live exports	n.a.	n.a.	n.a.	n.a.	3.6%	-1.6%	47%	3.4%	n.a.	n.a.	n.a.	41.1%	n.a.	44.4%
Slaugthers	-0.4%	0.5%	1.8%	-0.6%	-1.8%	-1.3%	2.1%	-1.7%	3.1%	-0.9%	2.2%	-0.1%	0.3%	3.2%
Net production	0.2%	-0.5%	1.6%	7.7%	-4	-0.8%	2%	-1.1%	0.2%	-1.7%	2.6%	0.5%	-0.1%	6%
Meat imports	5.4%	6.4%	9.8%	7.3%	5.6%	4.9%	1%	4.2%	11.8%	-3.1%	3.3%	4%	25.5%	73.4%
Meat exports	2%	-100%	-100%	n.s.	-1.1%	2.6%	12.1%	3.1%	34.3%	6.8%	41.5%	43.8%	-42.3%	17.1%
Availabilities (P+I-E)	1.4%	0.3%	3.9%	7.5%	-2.6%	-0.3%	1.2%	0.4%	8.9%	-2.9%	2.6%	1.8%	0.6%	7.4%
Ovine and Caprine species														
Three-year average for the period 2001-2003 and 2008-2011														
Domestic production ('000 heads)*	100,800	95,774	2,260	2,463	10,918	13,125	3,219	4,909	22,760	13,098	8,084	8,075	10,987	13,060	5,245	4,390	268	289	9	9	8,617	11,742	2,325	1,907	4,772	4,670	21,335	18,037
Live imports ('000 heads)**	4,589	3,869	0	2	9	3	141	18	333	484	403	470	1,1126	480	1,914	1,521	567	208	0	0	0	0	95	73	0	0	1	609
Live exports ('000 heads)**	1,814	1,388	0	0	0	0	0	0	940	480	543	789	6	47	13	3	10	11	0	0	0	1	28	31	0	0	274	27
Net live trade (E-I, '000 heads)	-2,775	-2,480	0	-2	-9	-3	-141	-18	608	-4	140	319	-1,121	-433	-1,902	-1,518	-557	-197	0	0	0	0	-67	-42	0	0	273	-582

Table 1 - Continuation

		CIHEAM		Albania		Algeria		Egypt		Spain		France		Greece		Italy		Lebanon		Malta		Morocco		Portugal		Tunisia		Turkey
Slaugthers ('000 heads)*	103,403	97,752	2,260	2465	10,918	13,125	3,247	4,910	22,611	12,826	7,990	7,883	11,749	13,382	6,941	5,978	854	683	9	9	8,617	11,741	2,363	1,1914	4,777	4,670	21,067	18,167
Net production ('000 tcw)*	1,423.8	1,380.3	19.5	21.3	177.3	212.4	75.5	133.1	251.2	138.9	137.2	131.7	125.3	144.3	63.5	54.2	18.2	13.9	0.1	0.1	134.8	161.4	24.7	19.6	64.6	60	331.8	289.2
Meat imports ('000 tcw)**	213.5	208.2	0.3	0.5	2.5	0.3	0.7	8	11.1	12.6	140.8	136.5	16.9	9.7	30.2	27.8	0.5	1.2	0.9	0.6	0.5	0.6	9	8.7	0	0.9	0	0.7
Meat exports	37.1	41.9	0	0	0	0	0	0.1	23.6	26.8	10.5	10.5	1.4	1.8	1.3	2.1	0	0	0	0	0	0	0.2	0.6	0	0	0.1	0
Net méat trade (E-I, '000 tcw)**	-176	-166	0	0	-3	0	-1	-8	12	14	-130	-126	-16	-8	-29	-26	0	-1	-1	-1	-1	-1	-9	-8	0	-1	0	-1
Availabilities (P+I-E, 000 tcw)	1,600.3	1,546.5	19.8	21.8	179.8	212.7	76.2	141	238.8	124.7	267.5	257.7	140.8	152.3	92.4	79.9	18.7	15.1	1	0.8	135.4	162	33.5	27.8	64.6	60.9	331.7	289.8
Annual percentages for the three-year periods between 2001-2003 and 2009-2011																												
Domestic production	-0.6%	1.1%	2.3%	5.4%	-6.7%	0	2.2%	-2.2%	0.9%	0.5%	3.9%	-2.4%	-0.3%	-2.1%														
Live imports	-2.1%	37.2%	-12.2%	-22.5%	4.8%	1.9%	-10.1%	-2.8%	-11.8%	n.a.	38.5%	-3.1%	-100%	117.5%														
Live exports	n.a.	n.a.	n.a.	n.a.	-8.1%	4.8%	30.9%	-14.6%	0.4%	n.a.	n.a.	1.4%	n.a.	-25.2%														
Slaugthers	-0.7%	1.1%	2.3%	5.3%	-6.8%	-0.2%	1.6%	-1.9%	-2.8%	0.5%	3.9%	-2.6%	-0.3%	-1.8%														
Net production	-0.4%	1.2%	2.3%	7.3%	-7.1%	-0.5%	1.8%	-2%	-3.3%	1.1%	2.3%	-2.9%	-0.9%	-1.7%														
Meat imports	-0.3%	5.5%	-22%	35.5%	1.6%	-0.4%	-6.7%	-1%	11.7%	-3.9%	1.7%	-0.4%	96.3%	51%														
Meat exports	1.6%	-100%	-100%	n.s.	1.6%	0	3.3%	6.5%	-21.5	-100%	23.8%	18%	n.a.	-31.6%														
Availabilities (P+I-E)	-0.4%	1.2%	2.1%	8%	-7.8%	-0.5%	1%	-1.8%	-2.6%	-3.2%	2.3%	-2.3%	-0.7	-1.7%														

* Source: FAO; ** Source: ITC; n.a.: non applicable; n.s.: non significative.

The situation is more contrasted in the trade of *small ruminants*. Regarding exports, Spain and France differ from other countries, with respectively about 500,000 and 800,000 heads per year (strongly decreasing in Spain and increasing in France). However, other countries like Greece, Portugal and Turkey also have significant export levels. The levels of ovine imports are decreasing in Italy (about 1.5 million heads per year), in Greece (500,000 heads per year) and in Lebanon (200,000). On the other hand, imports in live sheep increased in Spain and in France (approximately 475,000 heads per year) as well as in Turkey (600,000).

The area thus presents great opportunities for the four analysed product lines. Flows should be detailed to specify the type and the origin of the products concerned.

Who fills the gaps?

Table 2 provides a summary of the products flows supplying the studied countries in the livestock and meat sector.

Live bovine animals

Customs statistics (six-digit nomenclature) enable to distinguish the pure breeding cattle from those intended for fattening and slaughter. However one should be cautious when interpreting this data because various measures (tariffs, specific subsidies for pure breeds, etc.) may encourage to declare categories and destinations that are different from reality.

In all countries of the area, pure breeders represent only a small share of imports even if they are strongly increasing, going from 4% to 8% of cattle flows over a decade. After the 2001 bovine spongiform encephalopathy (BSE) crisis in Europe, practically throughout the last decade, Algeria, Morocco and Turkey only authorised imports of pure-bred breeding cattle. This trade involves animals (mostly dairy heifers ready to calve) that are much more expensive than livestock for fattening or for slaughter.

The first five suppliers alone represent more than 80% of imports. The market share of the twenty seven countries of the current EU fell from 99% at the beginning of this decade to 88% at the end, the United States becoming the fourth supplier of the zone with an 11% market share.

The cattle for fattening or for immediate slaughter represent the great majority of livestock imports in the zone. They increased from 2.5 to 2.8 million heads per year over a decade. Italy is by very far the main importer but imports were always significant in Lebanon. They have also rapidly increased in Turkey after the market opening at the end of 2010 and, to a lesser extent, in Albania, Algeria, Morocco and Tunisia. The increase in non-EU countries is especially noticed at the end of the period, after the lifting of sanitary barriers related to BSE. Egypt is an exception because the level of livestock imports fell by nearly 50% between the beginning and end of the period.

Table 2 - Main origins of imports in the member countries of the CIHEAM

	Average period	Quantity ('000 heads or t)	Number of suppliers	N° 1		N°2		N° 3		N° 4		N° 5		Total 1-5	Total EU
				Country	pdm	Country	pdm	Country	pdm	Country	pdm	Country	pdm	pdm	pdm
Bovine species															
Bovine breeding animals	01-03	108.35	25	France	37%	Germany	24%	Belgium	10%	Netherlands	8%	Austria	8%	88%	99%
	09-11	246.86	29	Germany	23%	Austria	19%	France	19%	USA	11%	Ireland	9%	80%	88%
Other live bovine	01-03	2,502.98	37	France	61%	Germany	10%	Australia	5%	Poland	4%	Spain	4%	83%	95%
	09-11	2,779.5	41	France	48%	Uruguay	8%	Poland	6%	Hungary	4%	Spain	4%	71%	84%
Fresh/frozen bovine meat	01-03	687.89	53	Germany	25%	Netherlands	21%	France	17%	Spain	10%	Belgium	6%	78%	96%
	09-11	1,032.46	54	Netherlands	20%	France	17%	Germany	16%	Poland	10%	Spain	8%	70%	95%
Fozen bovine meat	01-03	283.96	48	Brazil	36%	Argentina	10%	India	9%	Uruguay	8%	Netherlands	6%	70%	32%
	09-11	402.49	60	Brazil	36%	India	19%	USA	7%	Italy	5%	Netherlands	5%	72%	25%
Processed bovine meat	01-03	35.87	54	Brazil	28%	Argentina	21%	USA	11%	Germany	7%	Netherlands	6%	73%	35%
	09-11	74.18	66	Germany	25%	Brazil	18%	Spain	10%	Ireland	10%	Argentina	8%	71%	70%
Ovine and caprine species															
Live ovine/caprine animals	01-03	4,589.29	38	Hungary	21%	Spain	20%	Romania	19%	France	11%	Netherlands	6%	77%	85%
	09-11	3,868.73	39	Romania	22%	France	20%	Hungary	17%	Spain	12%	Bulgaria	9%	80%	91%
Fresh/frozen ovine meat	01-03	134.69	38	UK	32%	Ireland	29%	Spain	11%	N. Zealand	9%	Bulgaria	4%	85%	86%
	09-11	138.39	35	UK	48%	Ireland	12%	Spain	10%	N. Zealand	9%	Belgium	7%	86%	87%
Frozen ovine meat	01-03	70.01	35	N. Zealand	68%	Belgium	7%	Australia	5%	Spain	4%	United Kingdom	4%	88%	20%
	09-11	58.12	38	N. Zealand	54%	Australia	8%	Ireland	7%	Spain	5%	Argentina	5%	79%	23%
Fresh/frozen caprine meat	01-03	3.46	21	France	48%	Spain	14%	N. Zealand	13%	Bulgaria	13%	Greece	5%	93%	83%
	09-11	4.67	20	France	46%	India	12%	N. Zealand	12%	Spain	8%	Netherlands	5%	83%	66%

Source: compilations based on data from ITC.

The number of suppliers for this type of animals is more important than for purebred breeding and the market share of the first five suppliers went down from 83% to 70% during the last decade. If the EU countries remain dominant due to special sanitary agreements but also because of the geographical proximity, Australia has regularly supplied such animals to the countries in the Near East, Egypt in particular, and more recently Latin American countries such as Mexico, Colombia, Brazil and even more Uruguay, also gained shares of this market.

Regarding exports of breeding cattle, given the extent of the resources needed to set up appropriate genetic selection programs (size of the reference herd, date collection and data processing systems, etc.) and of the strong international competition, only two countries in the area, France and Spain, are significant exporters, with over 50,000 heads per year for France. France also represents more than 85% of exports of "other cattle"; the flows of animals for fattening or slaughter were recently developed for exports to North Africa and Turkey, but Italy and, far behind, Spain, remain France's major historical markets.

Bovine meat

As for beef, customs statistics enable to distinguish fresh/chilled from frozen, bone-in from bone-less cuts, and finally processed products. These various forms each have different logistic constraints.

During the analysed period, the beef imports in the studied countries increased at an average rate of 5.4% per year. We notice a very clear difference between imports from EU countries – except Malta, from Lebanon and Turkey, mainly consisting of fresh/chilled products, and those of southern Mediterranean countries, from Albania and Malta, essentially consisting of frozen products. The flows of frozen beef are mainly made up of boned meat, while the share of boneless meat is very variable in imports of fresh/chilled beef, going from 0% in Turkey to 10-20% in Italy and Greece, 40% in Spain and France, and 65% in Lebanon. The share of processed products (salted, in brine or canned) is low, around 5%. Nevertheless, the imported volumes doubled during the analysed period.

The total number of supplier countries decreases when passing from processed meat to frozen beef and then to fresh/chilled beef. The market of fresh/chilled beef is essentially dominated by EU countries with an almost constant market share of 95% during the period. On the other hand, with regards to frozen meat, the share of EU countries fell to 25% at the end of the decade (against 32% at the beginning). The main frozen beef suppliers are Brazil, with a relatively constant market share, India (strongly growing), the United States and then Italy and the Netherlands. It is important to note that Argentina and Uruguay partially withdrew from this frozen beef market due to a declining production: they favour exports of products with higher value (i.e. chilled). In terms of processed beef, the market share of EU countries doubled between the beginning and end of the period.

Live sheep and goats

The customs statistics SH6 nomenclature only distinguish the two species. However, today, goats represent less than 1% of the total imports and exports presented in Table 1 (against 4% of imports and 5% of exports at the beginning of the period). Spain, Portugal and Italy are the main goat importers, while France and Spain are the main exporters. The main sheep importers are Spain, France, Greece, Italy and Portugal, but also Egypt, where import levels have strongly dropped, Lebanon where imports have also been decreasing and Turkey, in the past two years. It is essentially Spain (decreasing) and France (increasing) which export, followed by far by Greece, Portugal and Turkey (the levels of export from Turkey having collapsed).

For both species a little less than forty countries supply the countries of the area and this figure did not change significantly during the analysed period. The market has even tended to concentrate as shown by the higher share of the top five suppliers, and the EU members' total share also rose. Australia and Syria, the top non-EU suppliers, only reach the 6th and 8th position.

Sheep and goat meat

Customs statistics enable to distinguish goat meat from sheep meat and, for the latter, fresh/chilled products from frozen meats, with or without bone.

The levels of goat meat imports remain very low, i.e. under 5,000 tonnes per year for all the studied countries. Followed by France, Spain and Portugal, Italy is the main goat meat importer.

Two thirds of sheep meat imports are fresh/chilled, a share that increased during the examined period. However, as for beef, this average hides significant differences between countries. France is by far the main importer of the area and about 80% of its sheep meat imports are fresh/chilled. The proportion is slightly lower in Italy and falls to about 50% in Portugal, a bit less in Egypt and to below 20% in Spain. In other countries of the area, where imports remain marginal, sheep meat trade mainly consists of frozen products.

In both the fresh/chilled and frozen categories, the share of boned meat is very low; fresh/chilled boned meat imports increased from 2 to 6% between the beginning and end of the period, and slightly decreased from 9 to 8% for frozen meat. These boned meat products are essentially high-end muscle pieces intended for the catering industry.

The EU is the region's main supplier of chilled sheep meats with a rather constant market share of over 85%, while New Zealand is the main supplier of frozen meat, even if its market share fell during the period (from 68 to 54%). Only two countries of the area reach significant levels of sheep meat exports, Spain and France, and exports are mainly composed of fresh/chilled products.

Box 1: The world's major exporters are in the South

"New" countries are very often the main exporters of beef and sheep meat: farming for meat allowed the conquest of the territory and then its sustainable development. The livestock per hectare is generally lower for breeding herds, bovine or ovine. Extensive farming often valorizes lands that are less suitable for crops and limits production costs. It is the case of Australia and Brazil, which have fought for the leadership of bovine meat exports for over a decade. They have as much as (Brazil) or even more (Australia) cattle as inhabitants. However, this extensive farming is very sensitive to climatic incidents, which have increased since more than ten years in Australia (due to climate change). In areas with more regular rainfall, the surging raw material prices increases the competitiveness of crops and dairy products, and relegates cattle herds and sheep flocks even farther on marginal lands. For example, this is the case in Argentina, where cows are eliminated from the Pampa to the benefit of transgenic soya, but also in central-western Brazil, in the large Canadian and U.S. plains or even in New Zealand, where dairy production extends at the expense of the herd beef...

This marginalisation to ever more poorly served areas that are away from ports complicates the logistics of the meat sector and even more those of the live cattle and sheep sectors. New countries are beef exporters while the majority of their livestock is dairy. With 2.5 times more cattle than inhabitants and a considerable exportable surplus, New Zealand was the 5th beef exporter in the world in 2012 (and by far the top sheep meat exporter with 8 times more sheep livestock than inhabitants). India is also a special case, with a herd oriented towards dairy production,, limitations related to the poorly defined concept of the sacred cow and 40% of its population is vegetarian. With a potential of 324 million cattle in 2012, the exports of meat primarily results from religious prohibitions. India is about to become the main world beef exporter.

In comparison, member countries of the CIHEAM have significant beef cattle. Only France and Spain outstand, with cattle herds and sheep flocks in regions that are unsuitable for crops (mountains of the Massif Central and the Pyrenees, semi-arid regions like Andalusia and Estremadura) and in compulsory grass areas in more prosperous areas. These two countries are also the region's leading exporters.

Livestock or meat trade?

In all the countries, trade concerns both meats and live animals. It is interesting to look at the criteria, which lead commercial operators and public authorities to favour one or the other. We shall analyse the example of the bovine sector.

A geographical determinism

Only countries having vast pastures can have important herds of ruminants. The aridity characterising the southern Mediterranean countries "de facto" limits the possibilities of establishment and development of breeding herds. In other countries, land pressure and competition from other crops also contribute to limit the areas dedicated to pasture. Everywhere, the tendency is to push the beef breeding herds to areas with lower-quality pastures or mid-mountainous areas. Regarding dairy herds, the situation is more mitigated as the increase and concentration in demand, especially in urban areas, encourage farmers to maintain and even develop production close to consumption areas, even if it means compensating for the lack of

availability of pastures by favouring zero-grazing farming, which is not possible for beef cows because of the added production. The demand in breeding animals is thus generally limited for beef cattle. However, the demand is important for dairy heifers in order to benefit from the genetic progress in countries with the resources to set up selection programs, but also because it is often more expensive to raise replacement heifers than to import them for countries where fodder resources are limited.

Agricultural policy

Food safety is obviously at the heart of the concerns of all governments and the issue arises with all the more acuteness, as the gap between resources and needs is important. Population growth and the changing eating habits in Mediterranean countries, particularly in emerging and transition economies, motivate medium to long term choices, such as agricultural policies, as well as short-term decisions such as regulatory import systems.

With objectives that are both related to food production and the maintaining of the rural fabric, the EU has incorporated in its Common Agricultural Policy (CAP), measures to support ruminants farming with special premiums coupled to production, such as the suckler cow premium or the ewe premium. The questioning of the coupling of domestic support under the agreements of the World Trade Organization (WTO) pushes lawmakers to look for other incentive measures to maintain various forms of farming in areas that are unsuitable for other agricultural productions.

Besides, if the production of meat may not seem essential, the economic reality obliges political powers to consider the demand. The countries of the Maghreb initially banned imports of cattle for fattening to preserve their fodder resources, but authorised imports of dairy heifers to encourage the development of a local dairy production. Unfortunately, the prices of meat slaughtered locally encouraged the rapid slaughter of these dairy animals, which was against the initial objectives. Similarly, it is because of the sharp increase in consumer prices that in autumn 2010, Turkey authorised imports of beef and sheep meat as well as livestock after more than a decade of foreclosure.

Dynamism and pressure from the different chain components

In the EU, many years ago, Italy and Spain have emerged as cattle fattening specialists by relying, particularly in Italy, on high performance forage crops (corn in particular). Without sufficient breeding cattle on their national territory, these two countries drain a significant part of the store cattle produced in France but also in other countries of the EU such as Germany, Austria, and Ireland or even Poland and Romania. With fattening farms of a size well above the average prevailing in other EU countries and an undeniable expertise, Italian and Spanish fatteners are able to offer very homogeneous animals of high quality. The various sanitary crises led retailers and consumers to favour “national” origins (fattening and slaughter in the

country) thus contributing to maintain these flows of store cattle for fattening despite the increasing pressure of beef imports.

Nevertheless, within the sector, the interests of different stakeholders are often antagonistic. The measures taken in Turkey since 2010 clearly illustrate the difficulty of managing a supply chain. The authorisation of beef imports to control consumer prices soon had the desired effect but with an impact on the local slaughterhouses. In order not to penalize them too much, the government subsequently favoured imports of livestock for slaughter through differential duty rates. However, in October 2012, the government again amended tariffs to curb imports that might destabilise the farming sector in a period of crisis for cattle, mainly dairy (price squeeze effect between the rise in the price of cattle feed purchased on the world market and the stable domestic prices of dairy products, because they were higher than the world market and therefore not following its increases).

Consumer preference for locally slaughtered animals

Besides the impact of the sanitary crises and the traceability measures on the preference of European consumers for meats produced at national level, other factors have the same consequences. Historically, due to its fragility and the limited preserving means, meat was a product that was marketed shortly after slaughter to avoid its alteration (wet market tradition). Despite the advent of the cold chain, this tradition continues in many countries, and especially since the logistics are not always reliable. Combined with the will to preserve the slaughtering facilities and their economic role, this helps to explain the importance of the flows of fat animals for more or less immediate slaughter.

Among the studied countries, Lebanon is a major importer of such animals. After being unloaded in the port of Beirut, they are transported to farms around the city to serve as live meat stock. At logistical level, such live meat stock is indeed much easier to store and to move than in carcasses or vacuum-packed muscles. By controlling the sales of the animals, importers may thus progressively run out the large numbers that a cattle ship supposes and thus influence prices by supplying the market in terms of demand. If these operators want to control the sector by importing meat, they should have significant cold storage plants as well as a fleet of refrigerated vehicles.

Lastly, the will to control slaughter activities not only responds to economic considerations but in the Muslim countries, it also guarantees the *halal* nature of meat produced thereby. Although exporters worldwide are engaged in procedures and certification processes to produce *halal* meat to be able to supply Muslim countries, these procedures remain extremely heterogeneous and some channels prefer a local certification corresponding to their customary practices. Besides, this control also allows supplying traditional butchers, to which livestock importers are often connected in the southern Mediterranean countries, rather than hypermarkets and supermarkets.

Sanitary regulations

Whether for legitimate reasons or not, sanitary regulations often remain one of the main determinants of the international trade of animals and animal products. Within

the EU, the rule is that of free movement of goods and any barrier to trade should in theory, be subject to discussion and community decisions. However, the emergency sometimes requires unilateral decisions, such as France declaring an embargo on beef from the United Kingdom during the BSE crisis or, more recently, Italy blocking imports of French store cattle in 2008 during the outbreak of the bluetongue disease. These decisions, however, are subsequently revised or approved by European regulations.

At international level, rules to protect consumer health and the sanitary status of importing countries while avoiding disguised protectionism are contained in the SPS (sanitary and phytosanitary) agreement of the WTO, regulating how governments may apply measures related to food safety and sanitary standards for animals and plants. These standards are set by the World Organization for Animal Health (OIE). However, it is true that many countries often have stricter standards than those of the OIE and rapidly set up new barriers in case of doubt on the sanitary status of exporting countries or on the risks incurred during imports. The embargos related to the BSE were in force much longer than suggested by the OIE standards.

In an extremely schematic way, sanitary constraints increase when passing from the trade of genetic material (semen, embryos) to the trade of meat and then to that of animals for slaughter. They become even stronger for the trade of animals for fattening and lastly for the trade of breeding animals. This can therefore explain why a country imports a product category rather than another.

Box 2: The Italian fattening sector weakened by the economic crisis and the CAP reform

Italy is the region's leading beef and store cattle importer. Its 2012 production only covered three quarters of its consumption. Italian cattle slaughterings declined by almost 20% in a decade. This decline in production is due to the decline in Italian herd, but it is mainly due to the fall in imports of store catlle. These were first affected by sanitary events such as the bluetongue disease, which limited imports from France in 2008 and 2009 while France supplies more than 85% of these animals. After reviving again in 2010 and 2011, store cattle imports dropped sharply in 2012, for more structural reasons this time.

The fattening farms in the Pô plain, where the majority of these store cattle are fattened, benefit from many advantages: a very favourable soil and climate for corn and fodder production, geographical closeness to the French cow-calf area (essentially the Massif Central), the professionalism of its highly skilled fatteners, economies of scale of several thousands and even tens of thousands of heads in these fattening units, generous European aid, and above all, a privileged positioning in Italian modern retailing outlets (the young cattle born in France, then fattened and slaughtered in Italy benefit from a very good reputation and from a sales "premium" thanks to specific labelling).

Nonetheless these advantages are seriously threatened. To begin with, the CAP reform should lead to a convergence of aids per hectare, i.e. an important reduction for the fatteners since historically they have benefited from more important aids

than the average farmers. Moreover, due to the current economic crisis, consumption has decreased since 2010 (estimated at 11% in three years) especially in modern retailing and catering, the main outlets for this "French-Italian" meat: the premium granted for these animals is quickly decreasing. Lastly, the nitrate directive will impose a de-intensification in the Pô region that is the leading Italian region in animal production (young cattle but also pigs, poultry and milk). In theses time of crisis the cheapest beef is favoured. Fatteners try to adapt by importing store heifers, which produce smaller carcasses and are easier to sell rapidly in minimarkets or butchers shops. However, it is mostly the downscaling of modern retailing outlets that stock up more frozen or chilled beef from lower conformation animals (Polish young bulls, Irish bullocks, Brazilian zebus).

Specific logistical constraints

With the exception of processed beef, salted, in brine or canned, which represent only a low share of exchanges, the trade of livestock and ruminants meat has specific logistic requirements not only related to their fragility, but also due to the links between this trade and public health on the one hand, and animal health on the other hand.

Due to their prior involvement in international trade, EU countries adopted an arsenal of legal measures to ensure product quality and the welfare of animals, leaving traders take care of the logistics necessary to meet their obligations and prove they can do it. The situation is different in the South and East of the Mediterranean and we will focus on the difficulties encountered in emerging and transition economies.

Meat trade depending on the cold chain

All the meat-exporting countries have full command of cold for fresh and frozen foods and the technology is obviously available in all the countries included in this chapter. However, the logistics it implies in the agro-food sector requires both capital and labour and a highly skilled one. Giulio Malorgio and Laura Solaroli (2012) note that these means and facilities are still often lacking in the southern Mediterranean countries. They add that most of them do not have efficient facilities to satisfy market requirements regarding quality and management of fresh products. The problem is certainly more acute at the end of the chain, at traditional final distribution level.

Besides, the 3rd Edition of the Mediterranean Conference on Logistics (Medlog in 2010) recognised that with as much heterogeneity and segmentation as types of products, the problems of positive cold were much more difficult to control than those of freezing. It partially explains the importance of frozen meats compared to fresh/chilled meats in the imports of southern countries. Sébastien Abis (2012) also highlights the disparities between urban consumption zones, often coastal, where distribution of imported products is concentrated, and inland rural zones that are much less equipped and generally constrained to auto-supply. Beyond technology, Medlog 2010 also stressed the importance of the procedures and their scrupulous implementation, thus the importance of human capacities in order to guarantee the service.

Live trade, between drastic standards and available means

Most countries of the South and East of the Mediterranean largely - and sometimes mainly - purchase live animals. Since the beginning of the 2000s, the OIE has been assigned by its member countries to play the role of world leader in the field of animal welfare. A working group developed standards on the subject, and started with land and sea transport. These rather prescriptive standards define the obligation of means rather than the result, with consequences on transport equipment.

European legislation has evolved in connection with these works and applies not only to intra-EU transport but also to all those to or from one of the EU countries. Even if they sometimes consider them very demanding, exporters have adapted themselves to the constraints of this legislation while deploring the distortions it causes as many countries do not apply the OIE standards.

From the EU, with the exception of the routes towards Morocco and Turkey, which may use highways, exports towards southern Mediterranean countries are made exclusively by sea. While trucks loaded on ferries are still used for small shipments, most of the animals are loaded on especially chartered cattle ships for reasons of practicality and economy of scale. They are generally former car carrier-ships reconditioned according to European standards in India or in China and mainly belonging to Lebanese capital. With a capacity from 1,000 to 2,000 heads of adult cattle, the number of ships available is sufficient according to exporters. It is also important to note that ships coming from South America or from Australia are much bigger, with capacities of 7,000 to 15,000 heads, and up to 25,000 for some units. However, this overgrowth has limits because it is very difficult to manage massive landings (a ship of 45,000 heads was discarded after three journeys, only because there was no demand). The specificity of these equipments, trucks or ships, makes them return empty, which significantly increases transport costs.

In various European ports such as Barcelona, Sète, Trieste and Constanza, have been built for loading such ships, with storage pens, squeezing chutes and loading ramps. The French port of Sète is the most important one with the possibility of loading three ships simultaneously. In destination countries, many ports can handle ships but the facilities are generally not of the same standards. Port facilities lack unloading capacities and there are very few cattle trucks: the use of simple tipper trucks equipped with side rails and some sand at the bottom is quite widespread. The distribution of imported animals to farmers faces the same rolling stock problem, transport is sometimes even made in pick-ups for small quantities of animals.

The pressure from animal protection organisations in exporting countries can have profound consequences on these logistic aspects. For a long time, the Australian authorities banned exports of live cattle to Egypt because the conditions in Egyptian slaughterhouses were considered unsatisfactory. Nevertheless, the trade started again in 2010 after the opening of new facilities in the port of Sokhna, on the west coast of the gulf of Suez, financed by an Australian investor and including a feedlot with a capacity 25,000 heads, directly connected to the unloading dock by an 800 metre footbridge, as well as a slaughterhouse built to meet European standards. The system

of individual identification allows the Australian sector to guarantee that animals are handled according to standards identical to those which are effective in their country of origin. The facilities are used in full capacity, inciting other investors to consider copying the model.

Governmental services

Excessive bureaucracy in customs systems, slowness in administrative formalities and the difficulties in information flow still characterise southern and Eastern Mediterranean countries. They are major obstacles to the development of trade. However, operators consider that administrative problems are not crippling if the documentation is correctly prepared. Meat and livestock trade is highly regulated because of its sanitary implications, with certification by the veterinary services of the exporting country on the basis of certificates negotiated beforehand and accompanied by zootechnical specifications for the livestock.

Quarantine facilities are rarely located at the port but they are generally close by. In some countries like Morocco, they are situated at the approved importer. The capacity of these facilities does not seem to be a problem for importers but, nevertheless, it imposes spacing conditions for shipping as the quarantine period is followed by cleansing and disinfection of the premises. Inadequacies related to the capacity of laboratories responsible for testing during quarantine are sometimes mentioned during important landings.

Live trade is particularly sensitive and media coverage in case of problems involving cattle transport is always important, instigated by animal protection organisations. It is therefore in the interest of all parties to take the necessary measures to prevent such incidents. It is important to highlight the importance of collaboration between veterinary services and the role of the OIE in terms of information dissemination and capacity-building to prevent and resolve difficulties, for instance, those related to the use of different laboratory techniques or to their interpretation.

Box 3: Live cattle imports are still preferred in Lebanon

With about 4 million inhabitants, Lebanon is far from being the most populated country of the Mediterranean, but it is an important import centre. On the one hand, production covers only 10 to 15% of the Lebanese demand and on the other hand, the country has always been a platform of re-export, in particular towards Syria. Ten years ago, it seemed that fresh or frozen meat imports were on the rise compared to those of livestock. It is clear that the latter held up well despite all the constraints and the removal of European export subsidies for livestock at the end of 2005. Between 2010 and 2012, imports of livestock are stabilised at around 50,000 t cwe.

On the contrary, imports of beef have clearly dropped since 2009, down to 31,000 t cwe in 2012. They still consist of two-thirds of boned chilled cuts (mainly from Brazil) and a third of frozen cuts (especially from India). The meat distribution networks are very different. Frozen beef is mainly intended for industrial processing but also for the little controlled or uncontrolled circuits of butchers and small local catering businesses. It is likely that some used to be transported to Syria (undocumented flows). However, this declined due to the civil war.

Chilled vacuum-packed meat is mainly distributed by modern large-scale distribution, including the high-end catering business through a chain such as Métro. But, as in other Mediterranean countries (Greece or Turkey for example), meat wholesalers (trading carcasses and/or fresh cut) and butchers still prevail in this sector, in connection with livestock importers. The latter have invested in livestock carriers, and control most of the livestock trade on the Atlantic market. They have diversified their supply: formerly from Europe, today from Brazil, Uruguay... They have also diversified the destinations since they can now deliver Turkey as well as Venezuela. Their strong position and their professionalism are related with the continued preference of the Lebanese market for imports of animals for slaughter. This market is therefore far from disappearing some time soon as it was declared in Brussels or elsewhere.

Conclusion

Imports of ruminants' meats and livestock are globally expanding in all the studied countries, amounting from a 5.8 billion dollar average over the period 2001-2003 to 12.7 billion in 2009-2011 (while exports went from 2.6 billion dollars to 5 billion). They are stimulated by an increasing consumption in the South and East of the Mediterranean, while Europe suffers from the crisis since 2008, and by a better match between offer and demand, the generic term "meat" covering a multitude of cuts, processes and preservation techniques.

This expansion hardly benefits canned meat, yet the cheapest and whose logistics are the simplest. In the South, it is mainly made in frozen form: again, logistics is rather simple, even if compliance with the cold chain at the final distribution is often less assured. This is the majority of global market flows with a large number of potential suppliers for all price ranges.

The flows of chilled meats (sometimes carcasses, mostly vacuum-packed boned muscles in a slightly positive temperature) also progress, especially aimed at the most demanding clientele supplied by modern retailing outlets and high-end catering. Logistic requirements, traceability, logistics to be implemented limit the number of suppliers and EU countries often occupy a dominant position. The flows of livestock are the most complex in terms of sanitary controls, transport logistics... Nevertheless, they are strongly expanding towards Turkey or the Maghreb and are doing well towards Lebanon. They concern breeding animals (mainly dairy heifers) but especially animals for fattening, or for slaughter. The latter flows correspond to ritual slaughter requirements, the specific distribution and also the interests of the dominant operators in the meat sector (traders and wholesale butchers) in most emerging countries.

The challenges for the sustainability of these flows are still numerous. They particularly concern the sanitary or animal welfare standards in the trade of livestock, but also the ritual slaughter standards: a homogenisation of the recommendations would favour slaughter in farming countries. However, the substitution of livestock flows by chilled or frozen meat flows presupposes substantial logistic investments. It will

also involve a disruption in the role of actors of the sectors especially in importing countries, to the detriment of the cattle traders, slaughterers or traditional butcher and to the benefit of modern retailing and catering. This will have a social cost that governments can only accept in case of strong growth in formal employment. The strong growth in demand for ruminant meat in the region's emerging countries presents opportunities. Intra-regional trade would be promoted by specific agreements between the EU and southern Mediterranean countries, in terms of sanitary issues, customs and the development of local chains (technology transfer), etc.

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CHAPTER 13

TRADE AND LOGISTICS: THE CASE OF THE WINE INDUSTRY

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Archaeological evidence shows that vine cultivation and production occurred in the Caucasus (Maugh, 2011) and then spread across the Mediterranean thanks to the Phoenicians and above all, the Greeks who made and used wine amphorae as a currency for their trade (McGovern, 2007). Despite periods of setback, the diffusion of vine cultivation continued after the Greeks that were defined as a vine civilisation. During the Roman Empire, there was a period of expansion, when the Romans conquered the Gaul region. Vine cultivation was developed primarily to meet the needs of the legions but also to use wine as a currency of exchange in the trade of slaves and goods. In the Middle Ages, European monasteries encouraged the planting of vines and the development of vine growing and wine making techniques in the North. On the other hand, on the southern shore, winemaking declined with the spread of Islam (Doi, 2006; Sarmaad, 2011). With the industrialisation of the northern Mediterranean area and the development of railways, wine production shifted from the consumer regions, such as the Paris basin, to the French Mediterranean regions that became the largest world vineyard (Phillips, 2000; Johnson, 1989). Wine production spread down to the Maghreb where some countries were either colonised or under French protectorate. At that time, Algerian vines represented one third of French production.

Wines with strong alcohol content were thus imported from Algeria. These so-called "medicinal wines" were then blended with low alcohol wines produced in the South of France. For over a century they were sold as table wine for manual workers in conurbations and mining areas. With the decline in manual labour and changes in eating habits, the consumption of these "rough wines" collapsed during the glorious thirties creating a major gap between wine production and

consumption. When wine production declined in the Maghreb, the bulk of Mediterranean vine cultivation was developed on the northern shores of the Mediterranean and in the Balkans. There are about 4.2 million hectares of vineyards in the Mediterranean (including the Balkans). This represents 53% of the world production (7.7 million hectares) and over half the world wine production (145 million hectolitres out of some 270 million).

The Mediterranean region also provides one third of world production of fresh and dried grapes. Spain stands out with 1.1 million hectares and France and Italy with 850,000 hectares. These countries are the largest producers, consumers and exporters of wine. Then comes Turkey with over 500,000 hectares, mostly used for the production of fresh and dried grapes. Lastly, Portugal, with 248,000 hectares and Greece with 115,000 hectares should also be mentioned. Although the vine-growing regions of the islands of Cyprus and Malta are not significant compared to the production in the whole region, vine cultivation is an important sector of their agriculture.

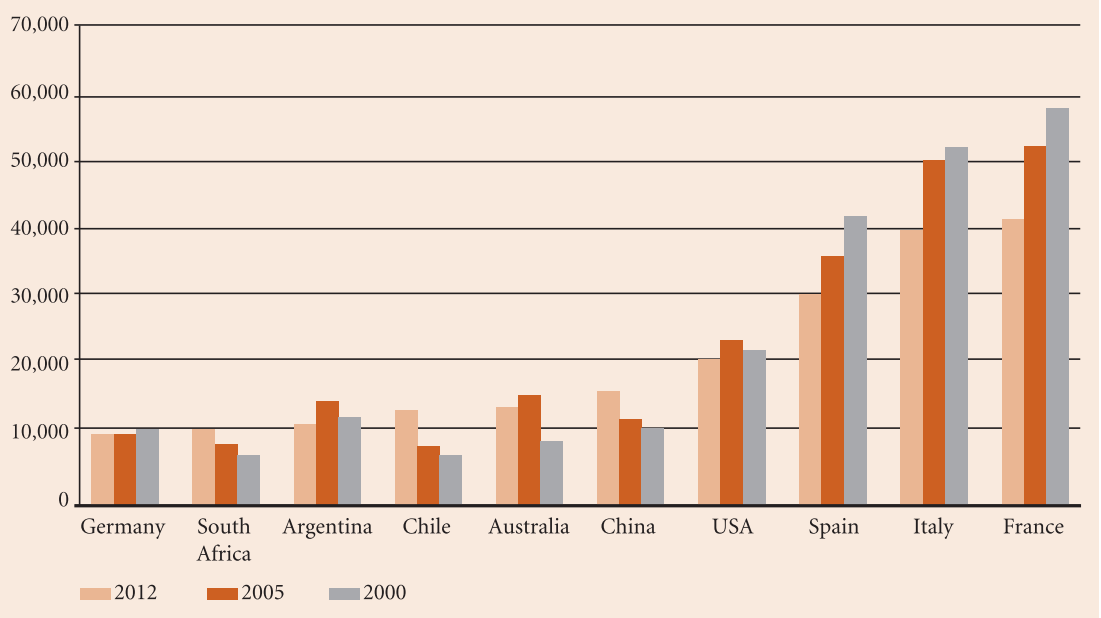
Global production, consumption and trade trends

The world surface areas of vineyards have decreased by 219 mha (-3%) in the past eleven years (2000-2010) with a total surface area of 7628 mha. As suggested by the data on European vineyard areas, this decrease is partially related to the implementation of the reforming discipline of the single CMO[1]. All major European producer countries have experienced a significant reduction in areas covered by vineyards, with a decrease of 16% in Spain, 15% in Italy and 11% in France. During the same decade, the vineyards' surface area has also increased in the so-called New World wine producers and in countries like Argentina (+8%), Australia (+24%), Chile (+16%) and New Zealand (+168%) due to the significant growth in this sector. These dynamics have been accompanied by a partial rebalancing among the top wine producers. As presented in Figure 1, traditional wine producers have reduced their production while new producers have increased theirs.

In 2012, the largest wine-producing countries in the world were France, Italy, Spain, the United States, China, and Australia. In 2000-2012, the growth rate was especially positive in Chile (88%), Australia (57%), South Africa (44%) and China. On the contrary, the growth rate was negative in Romania (-39%), France (-28%), Spain (-27%), Italy (-22%) and Brazil (-20%). In 2011, Italy, France, Spain, Turkey, Egypt and Greece were the most important producing countries in the Mediterranean in terms of harvested grapes (see Table 1).

1 - The Common Market Organization (CMO) for wine has been reformed in order to reduce overproduction, phase out expensive market intervention measures and to make EU wine more competitive on the world market.

Figure 1 - Production trends in the top 10 wine producers (2000-2012, in Mhl)



Source: OIV.

Table 1 - Production of harvested grapes in the Mediterranean area (2011)

Countries	Tonnes (in thousands)
Italiy	7,116
France	6,591
Spain	6,100
Turkey	4,296
Egypt	1,321
Greece	857
Algeria	650
Syria	338
Morocco	317
FYROM	235
Croatia	204
Albania	195
Slovenia	121
Tunisia	114
Israel	89
Lebanon	89
Jordan	38
Lybie	35
Montenegro	33
Bosnia and Herzegovina	22
Malta	4
Total	28,765

Source: Faostat.

In the Mediterranean region, France, Italy, Spain, Greece, Macedonia, Croatia and Algeria were the most important wine producers in 2011 (see Table 2).

Table 2 - Wine production in the Mediterranean area (2011)

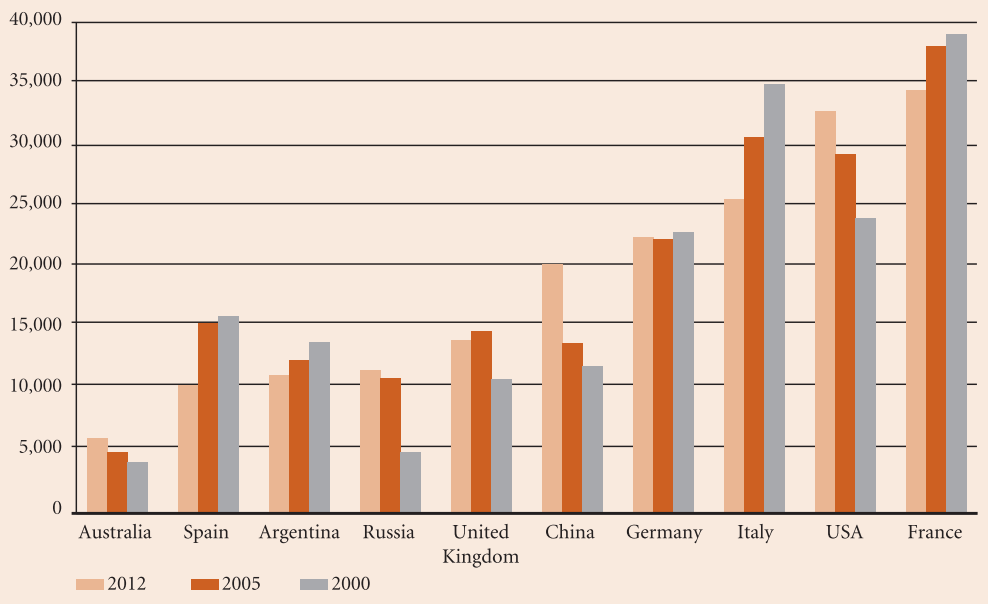
Pays	Tonnes
France	6,590,750
Italy	4,673,400
Spain	3,339,700
Greece	303,000
FYROM	66,530
Croatia	48,875
Algeria	47,500
Morocco	33,300
Turkey	27,950
Slovenia	24,000
Tunisia	23,200
Albania	18,000
Montenegro	18,000
Lebanon	14,200
Cyprus	12,000
Israel	5,000
Egypt	4,400
Bosnia and Herzegovina	3,354
Malta	2,450
Jordan	438
Syria	72
Total	15,256,119

Source: Faostat.

With regards to consumption, the global trend (see Figure 2) shows a steady growth in recent years, interrupted by the economic crisis that has had a significant impact on consumer behaviour. Consequently, the consumption of wine declined, especially in areas like Europe where it is traditionally higher. On the other hand, despite the economic crises, wine consumption is increasing in emerging markets.

The changes in the geography of consumption lead to the opening of new market spaces, thus increasing the volumes traded on the world market. In recent years the wine market has experienced a rapid process of globalisation.

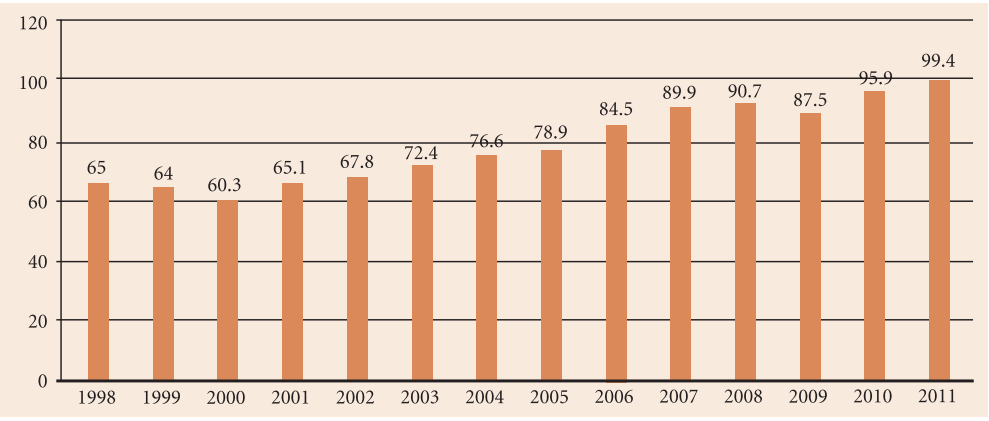
Figure 2 - Consumption trends in the top 10 wine consumers (2000-2012)



Source: OIV.

Consumer behaviour and the organisation of trade flows have significantly changed. The new market scenario is one of the most striking evidence of this change. Over the past two decades, new actors have emerged and their impact has been significant both in terms of geography of consumption and positioning on the wine markets. Exports play an increasing role in the global wine production sector: from the end of the eighties till now, the volume of exports has increased from 15% to 35%, i.e. by 20%. Some believe that wine trade has developed and exports grew during the nineties as the wine consumption in northern Europe and in North America, has strongly increased. This growth has compensated the decrease of consumption in Mediterranean countries, and the rise of exports of "emerging producers". In recent years, global wine exports have increased from 60 million hectolitres in 2000 to 99 million hectolitres in 2011 (see Figure 3).

Figure 3 - Trends of the global wine market: total exports (1998-2011, in mhl)

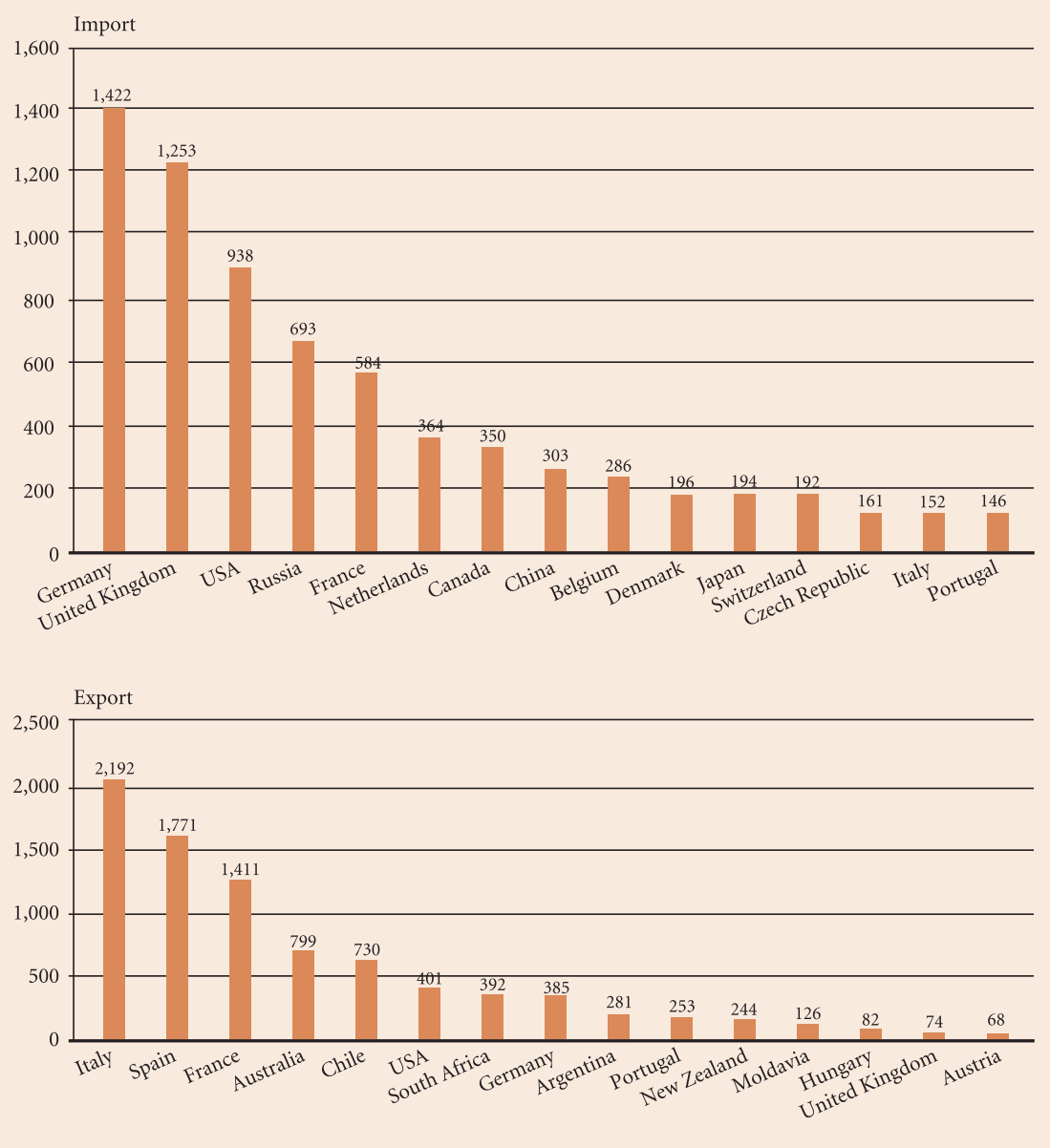


Source: OIV.

More recently, the increasing demand in the BRICS (Brazil, Russia, India, China, South Africa) countries has also contributed to the development of international trade. The gradual and persistent reduction in consumption in traditional wine-producing countries and the intensification of exports in the majority of producing countries including emerging ones, have placed the global wine market in a more competitive arena. The total world sales of wine forecasted for 2014 amounted to about 230 billion dollars.

In 2010, Germany, the United Kingdom, the United States, Russia and France wine the top wine importers in the world (see Figure 4) while about Italy, Spain, France, Australia, Chile and the United States were the top wine exporters.

Figure 4 - Import and export of wine in top 15 countries (2010)



Source: OIV.

Italy, Spain, France, Macedonia and Greece were the most important exporters in the Mediterranean in 2010 while Italy, Spain, France, Croatia and Greece were the top wine importers (see Tables 3 and 4).

Table 3 - Top 15 wine exporters and importers in Mediterranean area (2010)

Countries	Tonnes
Italy	2,192,254
Spain	1,771,386
France	1,411,363
FYROM	64,883
Greece	33,603
Belgium	21,510
Serbia	11,318
Montenegro	7,184
Morocco	5,701
Slovenia	5,250
Israel	4,472
Turkey	3,466
Bosnia and Herzegovina	2,952
Tunisia	2,524
Croatia	2,463

Source: Faostat.

Table 4 - Top ten wine importers in Mediterranean area (2010)

Countries	Tonnes
France	583,690
Italy	152,496
Spain	50,566
Croatia	14,832
Greece	10,843
Bosnia and Herzegovina	9,054
Slovenia	6,963
Cyprus	5,797
Israel	5,616
Malta	3,869

Source: Faostat.

In this regard, the traditional market configuration has completely changed. The increasing role played by new international players that are recording a spectacular performance both in terms of exported volumes and values, has interrupted the European hegemony in the international wine market. The newcomers (especially the United States, Australia, Chile and South Africa) have significantly increased their share in the global wine trade. Accounting for less than 5% of world wine export in 1980, they now they exceeded 30%, recording the largest increase in volumes in South Africa (+350%), followed by Australia (280%), Chile (275%) and the United States (+190%). This increase in exports led the new producing countries to gain ever-increasing share in important markets such as the market of the United Kingdom where Australia has become the biggest exporter, the United States market, where Australia has replaced France as the largest exporter after Italy.

This situation of growth has resulted in the export of a different quality of vine. In recent years, the most important sales were those of higher-priced wine products. As the OIV (2009) has pointed out, during the last twenty years, in Australia, the vast majority of wine exports were premium ones (97%). In fact, the growth of the so-called new world producers is characterised by the expansion of high value segments. The policies of quality and brand have now become key aspects of a global market affected by consumers that are better informed than in the past. This phenomenon has embraced all the major consumption areas of the world. This confirms that wine is not only an increasingly globalised product but it is progressively becoming a premium high value product.

Logistics in the wine supply chain

The emergence of a new wine market provides new opportunities for wine producers but requires logistics efforts and commercial strategies consistent with the country's specific situation. Today, one or more intermediaries supply retailers and operators of the HORECA (hotels, restaurants and catering) sector. For the marketing of wine worldwide, distribution systems adopt many different organisational models and respond to different regulations.

The complexity and the large number of different networks of access to markets make it impossible to establish a systematic representation of logistic structures and their performances. Furthermore, the wine industry has undergone some radical changes that have resulted in multiple paths of development of market relations. The type of product and the high segmentation that characterises the market have allowed the development of all types of distribution channels and promoted their complementarity. All the paths to bring the product to market and all marketing channels have experienced incredible developments, opening up opportunities for small and large producers, integrated and non-integrated in producer organisations. For instance, the direct-to-consumer channel – via an online retailer or through a mail order club – has been the fastest-growing channel in the United States. This confirms the growing importance of this channel for both wineries and consumers, going beyond boundaries of a few cult wineries. For a large number of small wineries around the world, the direct shipment of wine is now the main means of access to the market. At the same time, it represents an important brand-building instrument for medium and large wineries.

Table 5 - The main fairs of the wine sector in the Mediterranean area

Country	Denomination	City	Description
Greece	Oenos Thessaloniki	Thessaloniki	International wine fair
France	Vignerons indépendants Lyon	Lyon	French wine fair
	Salon Vins et Terroirs Toulouse	Toulouse	Wine exhibition
	Salon des Vins Reims	Reims	Wine fair
	Salon des Vins Paris	Paris	Wine fair
	Vignerons indépendants Paris	Paris	French wine fair
	Vinitech Bordeaux	Bordeaux	International trade fair for wine technology
	Vinisud Pérols	Pérols	Internationale exhibition of Mediterranean wines and spirits
	Vinexpo Bordeaux	Bordeaux	International fair for wine and spirits
	Vins de Loire	Loire	Wine exhibition
Israel	Israwinexpo Tel Aviv	Tel Aviv	International exhibition of wine
Italy	Autochtona Bolzano	Bolzano	Forum for indigenous wines
	Simei Milan	Milan	Enological and bottling equipment exhibition
	Vinitaly Verona	Verona	International wine and spirits exhibition
	Enolitech Verona	Verona	International trade fair for viticulture, oenology and technologies for olive growing and oil production
	Enologica	Faenza	Fair of wines and spirits
	Vitigno Italia	Napoli	National wine exhibition
FYROM	Wines and spirits	Skopje	Internationale fair of wines and spirits

Serbia	Etho Belgrade	Belgrade	Internationale trade fair for food, beverage and wine
Slovenia	Vino Ljubljana	Ljubljana	International wine fair
Spain	Salon del vino Iberwine	Madrid	International fair of wine
Turkey	Anfas Bevex Antalya	Antalya	International trade fair for the beverage industry

Source: developed by the authors.

In the scientific and professional literature there are only a few studies dealing with aspects of logistics in the wine industry. Moreover, the limited data available has enabled to conduct only qualitative studies based on direct surveys carried out among wine sector professionals. This is the case of the survey conducted by the ISLI Bordeaux Business School in 2003 aiming to analyse the logistics performance of actors in the wine supply chain in the Bordeaux region using the WCL (World Class Logistics) methodological approach. This is also the case of the more recent research conducted by the Italian Ministry of Agriculture with the aim of establishing ad hoc measures for the wine industry in the framework of rural development planning. The study based on direct interviews among wine sector operators was conducted with the aim of identifying the main logistical needs of the Italian wine industry.

The case of Bordeaux shows a well organised supply chain characterised by four main approaches to logistics driven by the relationship between wine brands and the market. In the first approach, the brand model, winemakers and wine co-ops grow grapes and are responsible for winemaking and blending, while bottling, labelling and packaging operations are carried out by logistics service providers. In this approach wine merchants work closely with consumers, thus limiting the power of winemakers and contributing to the reduction of product diversity.

In the second approach, the retailers' brand is a logistic configuration where wine merchants have been bypassed. Winegrowers ensure the grape harvest, winemaking and blending while retailers are involved in product design and communication, thus becoming the chain's key link and replacing wine merchants. These models represent the main paths to follow in order to adapt the wine supply chain to the competitiveness generated by the new world wines. According to the last two approaches, the *grand crus* and the direct sales can increase the market sales for producers involved, but their quantitative and qualitative characteristics place them outside the mass market.

The Italian case explores the main weaknesses in the domestic wine supply chain. It points out the high number of commercial actors involved, the length of the commercial channels leading to inefficiencies in the management of logistics, the low percentage of full load transport and consequently, the high transport costs and the scarce use of intermodality, whether by sea or rail.

Box 1: Logistics optimisation: the Caviro case

Founded in 1966, today, Caviro is not only a leading winemaker in Italy but also the daily wine market leader in Europe. The company has launched its range "Vini e Cantine d'Italia", including varieties from eight different Italian regions, especially designed for restaurants and special stores. At the same time, Caviro is widely present on the shelves of all large-scale modern distribution outlets with its main brands, "Tavernello" and "Castellino", sold in handy brick packs. The considerable volumes of wine marketed and the remarkable distribution of Caviro products reflect the interest of the company in logistics management and the monitoring of a number of critical factors including: the time needed for data alignment with logistic operators; a correct "saturation" of forwarders; route optimisation; the timeliness of the flow of information on product deliveries to sale outlets. Cavino chose a solution "on demand", offered by the platform Joinet to optimise collaboration with supply chain partners.

The main goal was to improve the communication flow in order to enhance the company's logistic performance in terms of speed, flexibility and consequently, operating costs. The first phase of the project consisted in establishing the ERP platform including a "dynamic assigner" that identifies the ideal logistic operator to process a specific order on the basis of parameters such as product characteristics and type of vehicle.

The project designed by Caviro included the use of MaNeM (Manufacturing Network Manager), a solution with a web integration tool enabling the interaction between the company and its logistic operators and in which the just-in-time order transmission operations, distribution planning data processing and feedback and automatic acquisition of the delivery plans submitted by the warehouse department system could be concentrated. MaNeM supplied the channel operators with an intermediate framework able to guarantee full information traceability and allowing exchanges and communication via the Internet, both at user level (B2B) and between information systems. The main processes managed from within the web environment, controlled by the Joinet solution include: transport orders (with the relevant modifications), customer/product profiles, trip planning, shipment confirmations, and order tracking complete with progress and outcome information. After shipping the goods, Caviro (during the evening) sends the list of orders to the logistic operator, completed with all the necessary information on the loaded consignments and makes it available on the Joinet platform. The computerised management of information and the support provided by the MaNeM platform have reduced lead time (the time between entering an order and delivering the products by a full day) to a full day. This is a really important aspect for commercial management, which has positive impact on the company's competitiveness.

Wine and climate change

Grapevines are one of the oldest cultivated plants and have been historically associated with Mediterranean climates. Nevertheless, today, grapevines for wine production are grown in many types of climates throughout the mid-latitudes: Mediterranean, marine west coast, humid subtropical, and semi-arid continental climates. Climate is a factor that influences both viability to ripen a specific variety of grapes and the resulting wine style. In general, the length of the growing season and temperatures are critical aspects because of their major impact on grape ripening and fruit quality and therefore varietal adaptation to a specific *terroir*. It is in its

ideal climate that a given grape variety can achieve optimum ripening profiles of sugar, acid and flavour to maximise a given style of wine and its vintage quality.

Climate variability and change affect the production of high quality wines. In the recent past, warmer and longer growing seasons with a reduced frost risk in many of the world's best wine regions have led to greater production and quality. However, future climate projections indicate the potential for threshold issues in which too much warming will probably alter traditional wine styles and the grape varieties planted. Moreover, global warming is likely to bring about spatial shifts in viticultural viability. Recent research on the impacts of climate change on wine factors has shown that: climate was the dominant factor, accounting for over 50% of the variation when averaged across all quality parameters; soil type and structure is the next most important factor, accounting for a quarter of the resulting wine quality; varietal differences, while not as important as climate or soil, still account for 10% of the variation in quality parameters; the cultural component of *terroir* roughly accounts for only 15-20% of the variation in important wine quality parameters.

Other research shows that climate change impacts are likely to be region-specific. Changes in cool climate regions (the Mosel Valley, Alsace, Champagne, and the Rhine Valley) could lead to more consistent vintage quality and possibly even the ripening of warmer climate varieties. However, each of these cool climate regions has or nearly has the optimum climate required for the production of the best quality wine with the varieties they grow. In the same way, regions that currently have warmer growing seasons (South California, South Portugal, the Barossa Valley and the Hunter Valley) may become too warm for the existing varieties grown there. As for hot climate maturity regions, they may become too warm to produce high-quality wines of any type. Winter temperature changes would also affect viticulture by making regions that experience hard winter frosts (the Mosel Valley, Alsace and Washington) less prone to vine damage, while in other regions (e.g., California and Australia) latent bud hardening may not be achieved due to mild winters and pests that do not usually survive in cold temperatures may increase in number or severity. Within continents, traditional wine-growing regions can decline the production while areas of new climate suitability can increase them, as well as from the southern hemisphere to large newly suitable areas in the northern hemisphere. The magnitude of these redistributions depends on market forces, possible options for adaptation of the vineyard and the persistence of the reputation of wines. Such a change, even a small proportion, could cause considerable erosion of habitat brought by the implantation of vineyards over large areas in the new producing regions.

A Lebanese case study

The Phoenicians (civilization of Canaan) played a very important role in the development of winemaking as through their extensive trade network across the Mediterranean region, they disseminated their knowledge of viticulture and winemaking technology (Phillips, 2000; Johnson, 1989).

According to the Christian New Testament (Gospel of John 2:1-11), the "wedding feast at Cana" is the first public miracle of Jesus, where he turned a large quantity

of water into wine (Royster, 1999). Moreover, the southern Lebanese village of "Qana" is one of four villages that claim that it is the biblical Cana (Salameh, 1994). Many Lebanese, both Christians and Muslims believe the village to be the correct location. Even if Lebanon, home of the ancient Phoenicians, is not really listed among the "old world wine" countries, there are historical, cultural and economic evidences that confirm the importance of wine in the history of the populations that have inhabited these lands. Besides, climatic and geographical conditions make Lebanon one of the finest wine-growing terroirs in the world (Lechmere, 2012). Until 1990, there were only four wineries in Lebanon, basically all situated in the Bekaa valley: the "Château Ksara", one of the oldest wineries in Lebanon has been founded by the Jesuits in the nineteenth century, the "Domaine des Tourelles" founded in 1890, the "Château Kifraya" winery and the "Château Musar" in Mount Lebanon.

Since the end of the civil war, which had very affected production in general, the wine production has been developing due to the arrival of new private investors. For instance, in the region of Yamouneh, wine production has been established thanks to the financial support of a French cooperation program aiming at fighting against drugs). Today, there are more than forty Lebanese wineries. Many of them are located in the Bekaa valley due to the climatic conditions, soil structure and agronomic characteristics[2]. Generally, even the wineries that are not in the Bekaa Valley also used grapes from the Bekaa region for part of their wine production.

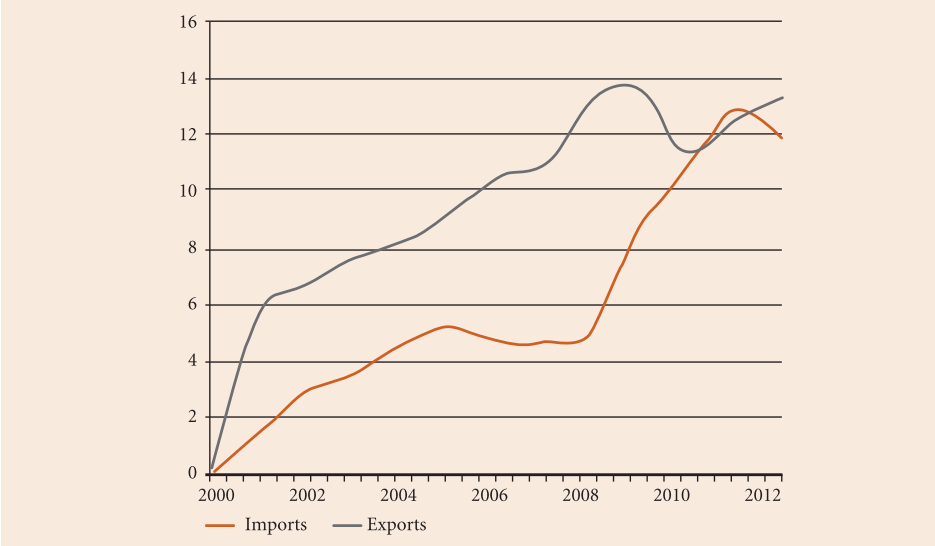
According to UNIDO estimates, the wine industry[3] is considered as one of the highest performing industries in the country, representing 10.17% share in the manufacturing industry (UNIDO, 2007). Moreover, as a part of the agro-food and beverage sector, it stands for the fourth highest sector in the total exports (MOET, 2007). It is estimated that 74% of the total yearly production of Lebanese wine is red and around 70% of this production is intended for local consumption (IDAL, 2005). In 2012, the wine sector exported approximately 2.58 million bottles (1,934,403 litres). Therefore, a rough estimate of the annual production of this same year was about 8.38 million bottles of wine i.e. 6,286,653 litres (NAJM, 2013).

The overall trend in the import-export of wine products is a continuous increase of the value and net quantity of exports compared to a constant reduction in the value and quantity of imports (see Figure 5). Europe is by far the biggest partner of the Lebanese wine sector whereas the European market absorbs about 60% of the total imports and almost 95% of the exports of this item come from European countries (NAJM, 2013). The following figure (see Figure 6) presenting the top fifteen import-export partners, shows that France, the United Kingdom and the United States are the major importing countries and France, Spain and Italy are the major exporting countries.

2 - The Bekaa Valley is located between 900 and 1,200 m. of altitude. The Western Mounts break the influence of the Mediterranean weather making the climate in the Bekaa Valley closer to continental climates with dry and hot summers and temperatures that can easily go up to 40° C and typical diurnal shifts between 30° C and 10° C. Winters are very hard, rainy and snowy but temperature rarely falls to vine-damaging levels. Soils are usually situated on a base of limestone, topped by clay or loam, occasionally with lots of stones and gravel. In some places, one can also find rich *terra rossa*. Since rainfall is very limited during the growing season, diseases seldom strike the grapes. Moreover, around 300 sunny days a year ensure abundant and consistent harvests, very rich in tannins.

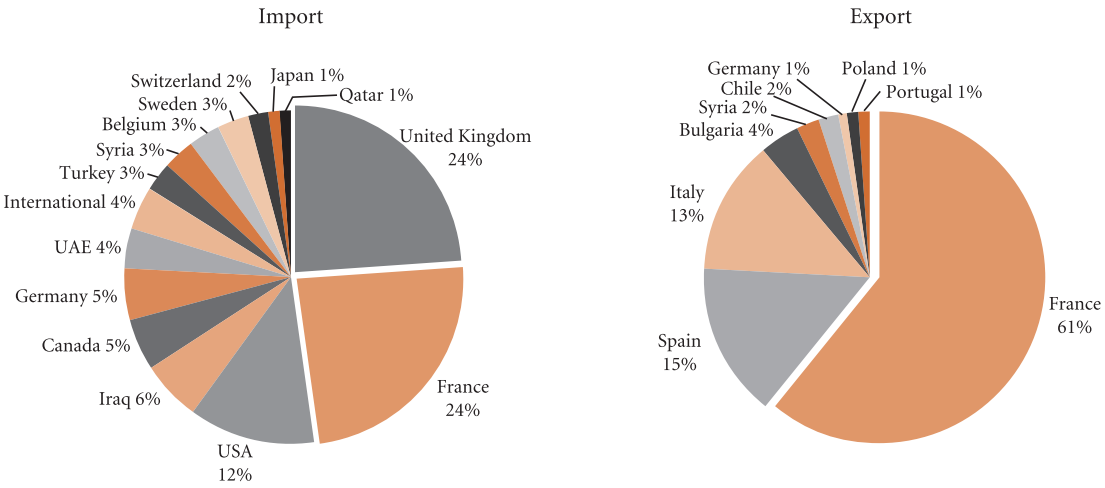
3 - In this study the import-export data of the Lebanese wine industry concern the following items: quality wine, wine of fresh grapes, sparkling wines and vermouth.

Figure 5 - Total imports and exports and quantities traded (2000-2012)



Source: NAJM (2013).

Figure 6 - The top 15 trading partners of Lebanon (2012)



Source: NAJM (2013).

Despite the improvements occurred since 2007 with regards to the overall performance of logistics organising the movement of goods over time and space, in 2012 Lebanon ranked 96 out of 155 countries (see Table 6). The Logistics Performance Index (LPI)[4] and its component indicators is the tool used to measure this performance (Arvis *et al.*, 2007). Therefore, when the component indicators of the LPI infrastructure, clearance procedures and quality of services are analysed, one can state that there are still some serious constraints in the development of this sector in Lebanon. Moreover, substantial

4 - The World Bank developed this tool to measure the performance of the logistics supply chain within the country. Enabling comparison across 155 countries, the index can help countries identify challenges and opportunities and improve the logistics performance.

performance improvement requires long-term and broad reforms and investments as well as the coordination of the various agencies involved (Arvis *et al.*, 2012).

Table 6 - Lebanese Logistic Performance Index (LPI) between 2007 and 2012

Lebanon	LPI and indicators 2012		LPI and indicators 2007	
	Rank	Score	Rank	Score
LPI	96	2.58	98	2.37
Customs	124	2.21	106	2.17
Infrastructure	102	2.41	102	2.14
International Shipments	85	2.71	88	2.50
Logistic quality and competence	119	2.38	93	2.40
Tracking and tracing	31	2.61	101	2.33
Timeliness	86	3.11	115	2.67

Source: Arvis *et al.* (2007 and 2012).

In the wine industry, quality remains a key factor (Castriota and Delmastro, 2009; Ashenfelter, 2007). Hence, the core objective is to attract a global market while retaining the regional character. For instance, the use of indigenous white grapes "Obaideh" and "Merwah" for still wine production is very common, especially at "Château Musar". Nevertheless, pointing quality did not stop Lebanese initiatives and ambitions. "Ixsir", one of Lebanon's newest wineries established in 2009 is a good example for this eagerness for innovation and competitiveness. This winery is a 100% eco-friendly winery and has been designated as one of CNN's "Greenest Buildings of 2011".

Besides, enotourism that has been defined in a variety of different ways (Mitchell, 2006; Charters and Ali-Knight, 2002; Hall, 1996) could be used as a resource for the flow of tourists. Enotourism is among the most innovative types of tourism and has a significant growth potential. Between the inherited lands, the transmitted know-how, the local label and the authentic inclination and tendency, Lebanon is *par excellence* a wine country with many challenges. First of all, it is impossible to write about Lebanon without considering the fact that it is a small and strategic country located in one of the world's most troubled areas. Consequently, Lebanese wine-makers face an instable economy depending on the political situation in neighbouring countries and in the region.

As Touzard (2010) suggests, Lebanon would be well advised to enrol in a perspective of "Systems of Innovation" (SI)[5]. Indeed, for the last two decades, both the "institutionalist approach" and "interactionist approach" were completely inexistent in Lebanon, given the fact that the Lebanese economy is based on private initiatives.

5 - The notion of "Systems of Innovation" is an analytical tool with two approaches: 1) an interactionist approach, taking into account relations, actors and institutions involved in concrete changes observed in the vineyards; 2) an institutional approach, assessing the evolution of the set of institutions formally dedicated to research, education, training and innovation oriented towards the wine industry.

However, since 2010, the Ministry of Agriculture is establishing a school of oenology and the Lebanese Agronomic Research Institute (LARI) attached to the Ministry of Agriculture has initiated some extension activities with farmers and launched a few studies on local grape varieties. Besides, some producers have gathered to establish the "*Union Viticole du Liban*" (UVL).

However, innovation is the key for competitiveness for the Lebanese wine industry and thus for economic survival of this industry. As a matter of fact, Pascal Le Masson, Benoît Weil and Armand Hatchuel (2006) considered innovation as a localised process of change, developed by concrete interactions between actors controlled by networks, knowledge and institutions. Therefore, the wine industry in Lebanon requires institutions to set a long-term general political framework, to organise the structure of unions and cooperatives and, finally, to outline research agendas (institutionalist approach). Besides, the organisation of trade unionists with concrete and effective relations active in nurseries union, growers union, wine union, oenological association and scientific research is also necessary An important step has been recently made. Indeed, since 2013, the Lebanese Institute for the Vine and Wine has been established to promote the industry in Lebanon and in the world.

Conclusion

Globalisation has increased the competition between wine producers around the world, creating a dichotomy that is the subject of a lively debate in the literature and is of interest to marketing sector. In old wine countries where production methods and the geography of the vineyard are well-established and relatively immutable, tradition and *terroir* are of utmost importance. On the other hand, in the new producer countries, experimentation and the development of winemaking techniques are the basis for the expansion of viticulture that explores new places.

Local cultures of consumption will shape production strategies and the global orientation and investment of the sector. In this regard, it should be noted that despite the ongoing research of the benefits of producing at lower cost and distributing to markets worldwide, globalisation does not always lead to forms of agglomeration and homogenisation. New and old world wine producers will respond in distinctive ways to the changes and trends within the global industry, adopting strategies that will evolve over time as their markets expand and mature; using competitive strategies shaped according to the varying relationship between different producers and their distribution (and especially major retail chains) networks, especially with regards to quality segments.

The world of wine is being shaped by broader and fundamental transformations in the global economy. Rapid economic growth has led to the emergence of new classes of consumers in the developing world (very rich and middle classes). To a large extent, these groups replicate the consumption patterns and preferences of their counterparts in the Western countries. The *nouveaux riches* have adopted wine, especially expensive wine, as a sign of wealth and sophistication. Their consumption of wine provides an image of elegance, affluence, luxury and worldliness. Product differentiation and the combination of tradition and innovation will play a very important role in the old world wine producing industry.

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CHAPTER 14

PORTS AND LOGISTICS: AN OVERVIEW OF POLICIES AND STRATEGIES

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Mediterranean ports have been closely associated with the maritime trade for centuries. The ancient Greeks travelled throughout Europe, and in more recent times, the great explorers departed from Mediterranean ports. Over centuries, southern European and North African ports remained the centre of maritime activities. Serving both the commercial and the tourism industry, Mediterranean ports are likely to remain very active in the future.

Mediterranean ports and related infrastructure have developed a logistics network that provides a connection, not only between the EU countries but also between Europe and Asia. The huge volume of goods to Europe passing through the Mediterranean ports demonstrates their importance. Agricultural products, garments from the Far East and the Middle East and electronic equipment are among the most important products transported through southern European ports. Finally, the trade of agricultural products in the EU and other countries is a major activity in which Mediterranean ports play a key role.

This chapter addresses ports and logistics including port facilities and their development. Currently, ports and transportation hubs in the world are chosen not only for their geographical position but also and especially because they serve global trade through a complete network with connections to other modes of transport providing services of integrated transhipment and transportation to the final destination. Thus inter-modality and co-modality criteria are of major importance in the question of the choice of ports. Co-modality is a notion that was introduced by the European Commission in 2006 as part of its transport policy. The idea is to define an integrated approach to transport modes and their combinations. For the European Commission, co-modality refers to the "use of different modes of transport alone or in combination with each other" and seeks "an optimal and sustainable utilisation of resources" (European Commission, 2006). In summary, the purpose is to present the corridors between the Mediterranean region and the European Continent that

offer modern transportation services and logistics, while reducing the environmental footprint of the transport sector.

Statistical comparison between southern and northern European ports

Due to the connection between Mediterranean ports, the European Market, and EU policy in general, this chapter outlines the recent trends of the statistical comparison between northern and southern European ports. The total weight of goods handled in EU ports was estimated at 3.7 billion tonnes in 2011, i.e. a rise of 1.7% compared to 2010. The United Kingdom has regained its position as the largest freight transport country in Europe, after falling behind the Netherlands in 2010.

The ports of Rotterdam, Antwerp and Hamburg, which are located on the North Sea coast, have consolidated their positions as Europe's three largest ports in 2010, both for the gross weight of goods and the volume of containers handled. The largest port in Europe, Rotterdam, recorded a fall of 6.4% in the gross weight of goods handled from 2010 to 2011 (mainly due to the reduced volumes of liquid bulk goods), while Antwerp and Hamburg both reported an increase in the total volume of goods handled during the same period. Most of the cargo handling in Rotterdam includes liquid and dry bulk goods such as oil, chemicals, coal and ores. However, Rotterdam is also Europe's largest container port, handling almost 15 million twenty-foot equivalent units (TEUs) in 2011, registering a substantial increase compared to 2010[1].

At the same date, container cargo accounted for more than half of the total tonnage of cargo handled in the more specialised ports of Antwerp and Hamburg. The port of Hamburg handled a total of 9 million TEUs in 2011, surpassing Antwerp, as the second largest container port in Europe in terms of the amount of TEUs handled. With the gradual recovery made in the last years, the port of Piraeus in Greece handled more TEUs in 2011 than before the economic crisis.

Among the top 20 cargo ports, Bremerhaven in Germany recorded the largest growth in terms of gross weight of goods handled in 2011 (+21.6%), followed by Taranto in Italy (+20.5%) and Algeciras in Spain (+17.4%). On the other hand, the port of Amsterdam experienced a substantial decrease in its activity in 2011 (-18.1%), due to reduced tonnages of dry and liquid bulk goods.

The most specialised among the top twenty cargo ports are Milford Haven in the UK, Bergen in Norway and Botas in Turkey (especially for liquid bulk goods), as well as Bremerhaven in Germany (mainly containers). If inbound activity prevails in most of these ports, those of Bergen and Botas also handle substantial outbound shipments of crude oil. The amount of outbound shipments of containerised cargo handled in the port of Bremerhaven is slightly higher than inbound shipments.

1 - Maritime ports freight and passenger statistics, Eurostat, 2013.

In 2011, the twenty largest ports accounted for 37.0% of the total tonnage of goods handled in the countries for which data are known in 2011 (EU-27, Croatia, Norway and Turkey), roughly the same as in 2010. The port of Rotterdam alone accounted for 8.6% of the total port activity in the reporting countries in 2011. Nine of the twenty top ports in 2011 are located on the North Sea coast, while eight are Mediterranean ports (see Table 1). The remaining three are located on the Atlantic coast (two of which are on the Channel). The presence of a country among the twenty largest cargo ports sometimes depends on the port infrastructure. Denmark and Greece, for instance, are two countries that have a large number of medium-sized ports (handling between 1 and 25 million tonnes of goods per year) but they have no ports whose volume of cargo handled goes beyond the threshold of 25 million tonnes.

The ports handling containerised cargo are more numerous in the north of Europe, while in southern Europe, ports mainly handle dry or liquid bulk goods. It is important to note that northern ports are platforms for products from the Far East (mainly electronics or final products) and this largely explains the difference. In some Mediterranean ports, dry bulk goods represent over 50% of the handled cargo. One of the most significant cargoes for international trade is the grain trade. Grain trade began thousands of years ago and it still remains one of the most important. Due to the importance of the grain trade in Mediterranean ports, the next section outlines this category of dry bulk products.

Trade and supply chain of agricultural products

In the logistic process, it is worth highlighting some methods and organisational functions to deliver a product to the final consumer, in the manner, time and cost estimated. As regards food products, the logistics activities are carried out by different operators (manufacturers, distributors, service suppliers, consumers) and may be grouped into seven categories: 1) Order management (order receipt, development, transmission, implementation and invoicing); 2) Stock management and inventory verification (definition of time and amount necessary to, upload and download the inventory, product coding and packaging); 3) Storage (storage of goods, quality and quantity controls before shipping); 4) Shipping (activities related to product shipment and waybill); 5) Packaging (pallets); 6) Delivery (products delivery from the starting point to the destination); 7) Management of sales returns and waste disposal ("Sustainable agri-food supply chains and systems").

Table 1 - Top 20 cargo ports in 2011 (on the basis of the gross weight of goods handled, in million tonnes)

Rang 2011	Ports	*	1997	2009	2010	2011								Growth rates 2010-2011 (%)	Average annual growth rate 1997-2011 (%)
						By direction			By type of cargo handled (%)						
			Total	Total	Total	Inwards	Outwards	Total	Liquid bulk goods	Dry bulk goods	Large containers	Ro-Ro Mobile units	Other cargo		
1	Rotterdam (NL)	=	303.4	353.9	395.8	288.5	81.8	370.3	47	22	25	2	3	– 6.4	+ 1.4
2	Antwerpen (BE)	=	104.6	142.1	160	88.8	79.7	168.5	27	11	51	3	7	+ 5.3	+ 3.5
3	Hamburg (DE)	=	69.6	94.8	104.5	67.2	47.2	114.4	12	22	63	0	2	+ 9.4	+ 3.6
4	Marseille (FR)	=	92.9	79.8	82.4	65	19.5	84.5	74	12	9	3	2	+ 2.5	– 0.7
5	Algeciras (ES)	+ 3	34.2	55.8	58.6	37.9	30.8	68.8	37	2	56	1	3	+ 17.4	+ 5.1
6	Botas (TR)	=	–	72	68.3	9.1	56.4	65.5	89	11	0	0	1	– 4.1	–
7	Le Havre (FR)	=	58.2	69.2	65.8	48.1	15.3	63.4	65	5	28	1	0	– 3.6	+ 0.6
8	Amsterdam (NL)	+ 3	36.9	72.7	72.7	43.1	16.5	59.6	56	37	0	1	5	– 18.1	+ 3.5
9	Immingham (UK)	– 4	48	54.7	54	43.3	13.9	57.2	37	36	2	24	2	+ 5.9	+ 1.3
10	Bremer-haven (DE)	– 1	16.6	42.7	45.9	25.6	30.3	55.9	0	0	91	0	8	+ 21.6	–

Table 1 - Continuation

Rang 2011	Ports	*	1997	2009	2010	2011								Growth rates 2010-2011 (%)	Average annual growth rate 1997-2011 (%)
						By direction			By type of cargo handled (%)						
			Total	Total	Total	Inwards	Outwards	Total	Liquid bulk goods	Dry bulk goods	Large containers	Ro-Ro Mobile units	Other cargo		
11	Izmit (TR)	+ 3	–	46.9	53.8	40.8	14.2	55	40	36	10	0	14	+ 2.2	–
12	Valencia (ES)	+ 2	16.3	48.3	53.1	27.6	26.6	54.2	8	4	78	1	8	+ 2.1	+ 8.9
13	Bergen (NO)	+ 1	–	56	49.8	11.3	41	52.3	91	5	0	0	4	+ 5.1	–
14	London (UK)	– 1	55.7	45.4	48.1	40.8	8	48.8	41	24	13	18	4	+ 1.5	– 0.9
15	Milford Haven (UK)	+ 2	34.5	39.3	42.8	32.2	16.5	48.7	98	0	0	2	0	+ 13.8	+ 2.5
16	Genova (IT)	+ 2	42.2	42.7	41.4	30.8	11.6	42.4	43	5	28	20	5	+ 2.3	+ 0
17	Trieste (IT)	+ 2	42.1	41	40.6	34.7	7.1	41.8	70	3	8	16	3	+ 3.1	– 0.1
18	Göteborg (SE)	– 2	31.3	38.9	42.9	21.4	20	41.3	52	0	21	27	0	– 3.8	+ 2
19	Taranto (IT)	+ 9	36	38.1	34.2	24.6	16.7	41.2	18	53	6	13	11	+ 20.5	+ 1
20	Dunkerque (FR)	+ 2	36.4	37.9	36.3	28.4	12.5	40.8	20	58	5	0	17	+ 12.5	+ 0.8
Total top 20 ports **		–	–	1,473.6	1.563,4	1,009.4	565.1	1,574.5	45	14	29	5	5	+ 0.7	–
EEA-IS+HR+TR (all ports)		–	–	3,946.2	4,203.1	2,587.2	1,699.1	4,286.3	–	–	–	–	–	+ 2	–

* This column indicates the number of positions lost or gained compared to 2010.
** Total figure for the ports being part of the top 20 ports during the reference year concerned.
Source: Eurostat.

Box 1: Grain Trade

The history of grain trade is as old as the birth of civilisation. International shipment of grain already existed at the time of the ancient Greek and Roman empires. Today, grain trade plays an important role in the global economy and governments are particularly interested in it. Grain has an economic and political importance and is also one of the major issues in policy making. The term mainly refers to wheat, corn etc. Soya beans are also considered as grains as evidenced by the International Grain Code. Grain is mainly transported by mini size panamax ships. Capsize ships are rarely used.The cereals sectors is dominated by five major players, like Cargill, that account for almost three-quarters of the global grain shipment. The major grain exporters are America and Argentina, while Japan and the Middle East are among the importing countries. Grain trade routes have recently changed due to industrialisation and technological advancement.

The changes have also been favoured by the availability of information provided by key indicators that allow traders to predict the production of grain. These key indicators include the Baltic Dry Index (BDI), which identifies the freight rates of several commodities (iron ore, coal, and grain) that are shipped around the world. Another indicator for grain is the IGC grain freight index (FAO, 2009). It is comparable to the BDI but is calculated only for grain cargo. Information about the grain trade is available on the websites of the FAO, the International Grains Council, the UNCTAD and the U.S. Department of Agriculture (USDA).

Box 2: Fruits

The cold chain is essential for the conservation of food products. Operators are starting to offer mobile refrigerated units, allowing for the perfect storage of goods without breaking the cold chain and simplifying, administrative procedures where this is made possible by health authorities and customs services. For instance, Sicilian oranges are delivered from Sicily to the CeDi of COOP in northern Italy on railways, using mobile bulk with passive refrigeration systems. At present, the service involves three daily bulk shipments on Trenitalia trains, but if only 15% of all oranges transported by road use this service, three trains per day could be filled. Maritime transport provides another example of how logistics can support food production: for the first time, MAERSK has delivered a mobile refrigerated bulk of Sicilian oranges to Japan, a rich market where Tarocco oranges cost one euro each. This example shows how lucrative logistics can create value for the Italian agriculture.

International maritime transport

Mediterranean ports serve not only short sea shipping cargoes but also international shipping. Even though countries around the Mediterranean consume mainly agricultural products from nearby regions, it is not unusual for products from Europe or other countries to be transported to the Far East to be processed and forwarded again to European or even to American markets as final products. The most commonly borrowed road for these shipments between Europe and Asia is the one that goes through the Suez Canal.

The route through the Suez Canal

When it opened in 1869, the Suez Canal was an unprecedented shortcut for shipping between Asia and Europe, ideal for offshore steamboats that were recently placed into circulation at the time. Previously, goods were sometimes unloaded from ships and transported overland between the Mediterranean and the Red Sea. Improved and deepened over the years, today, the Canal still retains its importance for world trade. It plays a pivotal role in the global network of container transport, especially because it makes it easier for ships on the Europe-Asia trade route. However, as surprising as it may seem, in the twenty-first century, a resurgence of piracy in the Gulf of Aden and off the coast of Somalia today, makes this road dangerous for merchant ships. Slow or small ships and vessels with a low freeboard are easy prey for armed pirates that demand a ransom to release the crew taken hostage. Between 2008 and 2010, it is estimated that the canal has lost 10% of its traffic because of this threat, and a further 10% due to the financial crisis.

The advantage of this route is that it saves distance and time, without leaving the high seas: 6,000 nautical miles separate the English Channel and Bombay through the Suez Canal, with an extra 4,500 miles via the Cape of Good Hope. Similarly, the route between the English Channel and Hong Kong through the Suez is of about 9,500 miles but if the Cape route is chosen, an extra 3,500 have to be sailed not to mention the risk of storms and further delays during the winter season in the southern hemisphere. An oil tanker going from Saudi Arabia to the United States has 2,700 nautical miles more to sail if the Cape route is chosen rather than the Canal one.

Cape Agulhas

The Cape of Good Hope, which passes through the Cape Agulhas at the southern tip of Africa, was the only possible route before the construction of the Suez Canal and, more recently, during periods when the latter was closed. It is still the only possible route for ships that are too large to pass through the Canal. Since the turn of this century, traders choose this long route more often due to the increased frequency of incidents of piracy in Somalia.

Daily operational costs must be considered, as well as the cost of extra fuel, even if the cost of bunkers declined in recent months. Shippers will have to wait another two weeks or more for their cargo, and they will pay rent for the ship during that time. Theo E. Notteboom (2012) analysed for which trade routes, the Cape route could be a competitive alternative to the Suez Canal. The commercial potential of this route has been determined from an analysis of the distance, transit time and overall cost. Interlining via the port of Algeciras and via the port of Coega (Ngqura) in South Africa were also compared.

It appears from this study that the Cape can be an alternative to the Suez Canal for eleven trade routes. The scenario, together with a sensitivity analysis reveals that the interlining through a hub near the Cape is expected to become more competitive due to a combination of increased Suez Canal transit fees, better economy of ships, higher bunker costs, slow steaming practices and competitive strategy of the price of

transshipment facilities in South Africa. If the Cape is more popular, it should also promote South-South trade between Asia, Sub-Saharan Africa and South America.

The northern sea route

The opening of the Suez Canal shortened by 20%, the trade routes between Europe and Asia. In 2008, with 21.6 million TEU, the Asia-Europe axis represented 30% of containerised freight transported on waterways across the world (Global Insight, 2008). UN economists believe that this market will grow at an annual rate of 5-6% by 2015 (United Nations, 2005). Thus, the Asia-Europe axis will reach a volume of 33 million TEUs in 2015 (Verny and Grigentin, 2009). The needs for transportation services and logistics will increase further as well.

While the capacity of many ports can be increased, it is difficult to consider applying the same strategy to the Suez Canal, through which currently transits most of the containerised traffic between Asia and Europe with more than 20,200 ships and 745 million tonnes of goods in 2007 (Drewry, 2008). The Canal has already started to suffer from the traffic flow of containerised cargo from Asia. At present, 46% of vessels transiting the Canal are container ships. Despite plans to increase the maximum size of ships (14,000 to 16,000 TEUs) in 2010, the Suez Canal will soon reach its limits (Drewry, 2008).

The northern sea route or the Northeast Passage is a waterway that connects the Atlantic to the Pacific Ocean through the Arctic Seas and along the northern coast of Siberia, from Murmansk on the Barents Sea to the Bering Strait and the Far East. Although the idea to sail through this navigation route dates back to the sixteenth century, it has been put into practice for the first time in 1878. The reasons for the use of the Northeast Passage are essentially economic. With a distance that is estimated between 2,100 and 2,900 nautical miles, this is the shortest route from northeast Asia to northern Europe (Wergeland, 1992). Estimates of the actual distance of this route vary depending on the choice of the route taken in the Arctic Seas, which depends on the distribution of sea ice in the region (Liu and Kronbak, 2010).

Observations have already confirmed the increase in air temperature, the thawing of the permafrost tundra and the decrease of snow-covered land (Pachauri and Reisinger, 2008). They have revealed that the Arctic sea ice is melting at a faster rate than what was expected in previous years. The early melting of the Arctic ice allows the opening of the Northern Sea Route.

In its assessment of maritime navigation in the Arctic, the Arctic Marine Shipping Assessment (AMSA) is very cautious when estimating the establishment of regular services of polar marine transportation (AMSA, 2008). Due to the reduction of sea ice, both coastal and port facilities will experience seasonal improvements. The study estimates that the transit of goods through the North Sea could become regular by 2025. Despite the fact that the coast of Siberia may be open to ships at an earlier date, the depth of water along the coast could prevent access to certain ships because of their size, thus limiting the transport capacity. This means that the choice of the Northern Sea Route may therefore not be cost-effective at first.

In summary, the Northern Sea Route can shorten 40% of the distance between Europe and Asia (between Rotterdam and Yokohama for example). However, a shorter distance does not necessarily mean immediate cost reduction, at least not to the same extent, and for various reasons: the high cost for icebreakers compared to conventional ships, reduced speeds and the need for additional services by ice-breakers and navigation ships. Lastly, the Northern Sea Route may be considered safer, less exposed to piracy when compared to the royal route that goes through the Suez Canal. Nonetheless, the use of the Northeast Passage on a large scale requires large investments to develop the infrastructure and services needed to ensure safety with the least possible impact on the environment.

Investments and improvements in Mediterranean ports

This section will focus on some of the ports in the Mediterranean Sea. Three ports will be presented, two of which are located in Europe and the other one in North Africa. The Port of Piraeus and the Port of Marseille have been established a long time ago while on the other hand, Tanger-Med Morocco has only been operational since 2007. The Port of Piraeus is the largest port in the eastern Mediterranean and it deals mainly with containerised cargoes. The Port of Marseille is the largest port in western Europe and it is known for bulk cargoes and crude oils. Tanger Med Morocco is the largest port in North Africa and expected to reach full capacity in the coming years.

Liner Shipping Connectivity Index

The countries' access to world markets depends largely on the connectivity of their transport, especially with regards to the regular shipping transport services for imports and exports of manufactured goods. The Liner Shipping Connectivity Index (LSCI) of the UNCTAD aims at identifying the level of integration of a country into global liner shipping networks. Table 2 presents the liner shipping connectivity index (LSCI), which indicates the level of integration of a country's level into the global network of liner shipping. The index base year is 2004, and the base value is the maximum figure recorded for a country in 2004. The current version of the LSCI is based on five components: the number of ships; the total carrying capacity of the container ships; the maximum size of vessels; the number of services; and the number of companies that deploy container ships for transportation services from and to a country's ports. The data come from Containerisation International Online and Lloyds List Intelligence. The index is generated as follows: for each of the five components, a country's value is divided by the maximum value of that component in 2004, and the average of the five components is calculated for each country. This average is then divided by the maximum average for 2004 and multiplied by 100. In this way, the index assigns a value of 100 in the country that experiences the highest average index of the five components in 2004.

Table 2 - LSCI as a percentage of the volume per year for Mediterranean Countries (2004-2013)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Albania	0.10	0.09	0.09	0.49	0.41	0.43	0.76	0.75	0.08	0.70
Algeria	2.45	2.25	1.95	1.68	1.62	1.58	5.54	5.13	1.25	1.09
Croatia	2.10	2.82	2.35	2.64	3.21	1.60	1.58	3.60	3.43	3.23
Cyprus	3.53	4.28	3.90	3.85	2.46	2.51	2.85	2.83	2.57	2.59
Egypt	10.51	11.38	11.21	9.71	10.96	9.82	8.38	8.45	9.20	9.09
France	16.52	16.18	15.19	13.88	13.83	12.66	13.20	11.87	11.24	11.85
Greece	7.41	6.72	7.01	6.57	5.66	7.91	6.03	5.31	7.29	7.17
Israel	5.00	4.64	4.58	4.58	4.14	3.52	5.85	4.71	5.01	5.13
Italy	14.26	14.38	13.03	12.59	11.66	13.21	10.49	11.60	10.63	10.64
Jordan	2.70	3.10	2.91	3.52	3.42	4.48	3.13	2.75	3.65	3.59
Lebanon	2.59	2.90	5.73	6.42	6.04	5.58	5.34	5.80	6.93	6.83
Libya	1.29	1.19	1.06	1.41	1.12	1.78	0.95	1.09	1.20	1.15
Malta	6.75	5.94	6.80	6.32	6.24	7.12	6.61	6.77	7.22	7.88
Morocco	2.30	2.01	1.91	1.93	6.22	7.25	8.69	9.11	8.83	8.78
Serbia and Montenegro	0.72	0.67	0.66	0.63	–	–	–	–	–	–
Spain	13.35	13.44	13.96	15.25	14.12	13.26	13.09	12.66	11.93	11.14
Tunisia	2.15	1.76	1.58	1.55	1.45	1.23	1.14	1.05	1.02	0.88
Turkey	6.28	6.26	6.07	6.98	7.44	6.04	6.36	6.51	8.52	8.25

Source: UNCTAD (www.unctadstat.unctad.org).

Tanger-Med Morocco

Tanger-Med is a cargo and passenger port located about 40 km east of Tangier, Morocco. Its capacity makes it one of the largest ports in the Mediterranean and Africa. The port went into service in July 2007 with an initial capacity was of 3.5 million containers, according to Tanger Mediterranean Special Agency (TMSA). A strategic priority of the Moroccan government, the port of Tanger-Med is expected to play a major role in the economic and social development of the northern region of Morocco. The project is also part of the political orientation of the country to export including eight clearly identified sectors, with a particular emphasis on the free trade agreement signed with the European Union, which came into force in 2012.

The completion of the Tanger-Med project will have a significant economic impact in terms of jobs, creation of added value and foreign investment. Its particular position on the Strait of Gibraltar at the crossing of two major sea routes and 15 km from the European Union, will enable the port to serve a market of hundreds of millions of consumers through the industrial and commercial free zones which will be run by renowned private operators. The port will also benefit from the strong market growth of container transshipment and become the leading hub for cereal transshipment, with facilities that do not currently exist in the northwest African region.

The project will be implemented, coordinated and managed by TMSA, a private company with public prerogatives operating under an agreement with the State in collaboration with the various ministries involved. The port complex will have a significant economic impact in terms of jobs, creation of added value and foreign investment. Besides, its construction, and the operation of free zones will have an important impact (direct and indirect added value, direct profits, jobs and foreign investment). The port is expected to reach full capacity by 2015 and to operate 8 million containers, 7 million passengers, 700,000 trucks, 2 million vehicles, and 10 million MT of oil products.

The Port of Piraeus

The Port of Piraeus, which is the largest port in Greece, is also one of the largest seaports in the Mediterranean and one of the top ten container ports in Europe. The port is also a major employer in the area, with more than 1,500 employees who handle over 24,000 ships per year.

The recent developments in Greece reinforce the interest of companies wishing to invest in the central and eastern European region. COSCO, a global shipping giant has leased half of the port of Piraeus. A little later, the American computer company Hewlett-Packard (HP) has chosen Piraeus as the distribution centre for its products destined for Central Europe, the Middle East, North Africa, the Mediterranean region and the former Soviet republics.

This change has increased the complexity of supply chains between the Far East and CEE countries, with increasing volumes of components and semi-finished products being shipped from the Far East every year. Therefore, transportation companies are constantly seeking effective and eco-friendly networks for greater integration within the manufacturing and retailing supply chains. Shipping companies are collaborating with operators of other modes of transport to provide faster and cost effective services through international intermodal networks. For example, HP products will be soon distributed by sea, from the terminal that COSCO controls in Piraeus and by land, via the state railway service operator TrainOSE (Lagoudis, 2013).

Even though the investments will mostly serve containerised cargoes, the port of Piraeus could be the door for the transportation of agricultural products through the Mediterranean, not only between Mediterranean countries but also outside the region. The amount of agricultural products, mainly fresh fruits and vegetables, that

are currently transported by sea in reefer containers is not negligible but it could be bigger. Both docks I and II are offering services of electricity supply to maintain the requested temperature of a reefer container during its stay in the port.

The Port of Fos Marseille

The Port of Fos-sur-Mer (also called the Marseilles-Fos) is located on the shores of the Gulf de Fos, a natural creek of the Gulf of Lion, on the French Mediterranean coast, about 38 km northwest of Marseille. The Port of Fos-sur-Mer is an industrial town where the ArcelorMittal steel factory is located.

The Port of Fos-sur-Mer opened in 1968 and has become the centre for Marseille's bulk cargo and container traffic. Its imports are mainly crude oil that goes to refineries in Fos and the Etang-de-Berre saltwater lagoon. Other imports include coking coal, iron and liquefied natural gas. The Port of Fos-sur-Mer also houses light manufacturing and services. Although its development has not been up to its initial expectation, the Port of Fos-sur-Mer has provided the city and the surrounding areas with many employment opportunities. The "new town" built to the north has radically changed the old village of Fos-sur-Mer.

In 2008, the Port of Fos-sur-Mer handled about 90 million tonnes of bulk cargoes. The number of passengers increased by 30% compared to 2007. The cruise traffic has increased substantially in 2008, reaching nearly 2 million passengers and offsetting the decline in traffic ferry or ferries. At the end of that year, however, the port has experienced a decline in general cargo (14 million tons), apparently due to the global financial crisis. The decline in activity that ensued has hit the container traffic, dropping from 7.7 million tonnes in 2007 to 774 thousand tonnes in 2008. Roll-on Roll-off cargoes increased by 1% compared to 2007 reaching 4 million tonnes, but conventional cargo fell dramatically to 2.3 million as the demand for steel products has declined and the motor industry underwent major cutbacks.

The Port of Fos-sur-Mer handled 42 million tonnes of crude oil and 11.1 million tonnes of refined products in 2008. The traffic of liquefied natural gas fell by 1% to 3.7 million tonnes, and liquefied petroleum gas fell by 5% to 1.7 million tonnes. The increase in coal imports has had a positive impact on dry bulk cargo which increased by 12%, reaching 13.5 million tonnes in 2008. Liquid bulk cargo also increased to 3.4 million tonnes, including bio fuels with a volume of 800 thousand tonnes. In 2007, the Port of Fos-sur-Mer handled six million tonnes of rail and river cargo from Rhone-Saone, including 127 thousand TEUs of containerised cargo.

Prospects of waterway transport

Transportation is one of the most significant industries of the economy and plays an important role in world trade. It directly employs some 10 million people in the EU alone representing 5% of its GDP. As discussed further in the chapter, the European Union recognizes the fundamental importance of transport for economic and social reasons. "Transport enables economic growth and job creation: it must be

sustainable in the light of the new challenges we face. Transport is global, so effective action requires strong international cooperation" (European Commission, 2011).

The White Paper of the European Commission

In order to prevent the rise in temperature, the EU aims to reduce its emissions of GHGs in all sectors by 80 to 95% by 2050 compared to the 1990 levels. For the transportation industry, this means a reduction of at least 60% by 2050 with respect to the 1990 levels. Although the goal of reducing GHG emissions is very ambitious, curbing mobility is not an option. This is why the EU published the White Paper "Towards a competitive and resource efficient transport system". This paper sets out the objectives and defines the possible solutions for a more efficient transport system, in which maritime transport is expected to play a major role. The EU seeks to effectively promote maritime transport rather than other modes of transport, and this will have a direct impact on port activity, especially in ports directly located on the Mediterranean.

Transport is expected to use less energy and cleaner fuels to take advantage of modern infrastructure and reduce its negative impact on the environment and key natural assets like water, land and ecosystems. Future development should be based on several components enumerated in the White Paper Roadmap to a Single European Transport Area (Uropean Commission, 2011):

- Improving the energy efficiency performance of vehicles across all modes. Developing and deploying sustainable fuels and propulsion systems;
- Optimising the performance of multimodal logistic chains, including by making greater use of inherently more resource-efficient modes, where other technological innovations may be insufficient (e.g. long distance freight);
- Using transport and infrastructure more efficiently through the use of improved traffic management and information systems (e.g. ITS, SESAR, ERTMS, SafeSeaNet, RIS), advanced logistics and market measures such as full development of an integrated European railway market, removal of restrictions on cabotage, abolition of barriers to short sea shipping, undistorted pricing etc.

Although these measures aim to reduce the carbon oxides and other pollutants, they will also have positive effects on the efficiency of ports and logistics. The transport of goods over short distances or at least over distances of less than 300 km, to a large extent, continue to be made by truck. Over longer distances, the options to decarbonise road transport are more limited and the multimodal transport of goods must be of economic interest to carriers. Efficient co-modality is needed. The EU needs specially developed corridors for freight transport, which are optimised in terms of energy use and emissions, with minimal impact on the environment and which are also attractive for their reliability, limited congestion and low operating and administrative costs.

On the coast, the entry points into European markets should be increasingly effective, avoiding unnecessary traffic across Europe. Seaports play a major role as logistics

centres and require efficient hinterland connections. Their development is vital to handle increased volumes of freight transported by sea at a short distance inside the EU but also to the rest of the world. Inland waterways whose potential is not fully utilised, have an increasing role to play particularly in transporting goods to the hinterland and in connecting European seas.

The maritime sector requires the establishment of equal conditions of competition at global level. The EU should encourage, in cooperation with the IMO and other international organisations, the implementation of universal standards and the monitoring of their application in the fields of safety, security, environmental protection, working conditions and the elimination of piracy. The environmental performance of shipping can and must be improved thanks to technology and the improvement of fuels and operations: the overall CO2 emissions of the EU related to maritime transport should be reduced by 40% (if possible by 50%) by 2050 compared to 2005 levels.

The interface between transport over long distances and last-mile freight should be organised more efficiently. The aim is to limit individual deliveries, the most "inefficient" part of the journey, to the shortest possible route. The use of Intelligent Transport Systems contributes to the management of traffic in real-time, reducing delivery times and congestion at local distribution. This could be performed with low emission urban trucks. The use of electric, hydrogen and hybrid technologies would not only reduce air emissions but also noise, allowing a larger share of freight transport in urban areas to be done at night. This solution would reduce road congestion during morning and afternoon peak hours (European Commission, 2011).

The White Paper Strategy could be summarised by the following points:

- By 2050, reduce EU CO2 emissions from maritime bunker fuels by 40% (if feasible 50%).
- 30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors. To meet this goal will also require appropriate infrastructure to be developed.
- A fully functional and EU-wide multimodal TEN-T "core network" by 2030, with a high quality and capacity network by 2050 and a corresponding set of information services.
- Move towards full application of "user country" and "polluter country" principles and private sector engagement to eliminate distortions, including harmful subsidies, generate revenues and ensure financing for future transport investments.

EU neighbouring and third countries

Relations with third countries are important for international trade, which is fundamental for European economic development. Therefore the transport connections supporting this trade are fundamental. Furthermore, and particularly with

regards to neighbouring countries, borders should not be an obstacle to intelligent transportation solutions that are in the interest of both sides. In geostrategic terms, the situation is very complex. Europe faces many factors and different situations: cooperation with Russia in the Baltic and Black Seas, increased trade with the Far East via the Suez Canal, the impact of the widening of the Panama Canal, good neighbourhood policy and the development of the Union for the Mediterranean, strengthening links to West Africa and South America. Each of these factors has a significant impact on maritime transport in general and on sea motorways in particular.

Transport cooperation with Africa is fundamental. Trade and transport between the two continents are an ancient tradition. Cooperation must now focus on the quality of the connections (systems and technologies), aligning the practices of the twenty-first century, thereby promoting economic exchange and prosperity in both continents. In the framework of the sea motorways, two important regions, the Mediterranean and sub-Saharan coasts, should be covered.

Firstly, ports policy and maritime transportation in the Mediterranean should be considered in the context of the Union for the Mediterranean. As part of this pro-active policy, the development of ports and shipping services across the Mediterranean are probably the most tangible and effective tools and the first priority for cooperation policies in this field. Spanish, French and Italian ports are particularly in a good position to establish a political framework for cooperation with North African countries (e.g. Libya, Tunisia, Algeria and Morocco). Particular attention should also be given to the hinterland links in Europe.

Secondly, on the African continent, the sub-Saharan coastal areas extend for thousands of kilometres and are equipped with ports and logistic lines primarily designed to ensure connections with inland areas rich in raw materials and commodities. In this context, it is particularly important to reinforce cooperation and ensure better connections with the western and eastern coasts of Africa. Some of the most interesting western ports in Africa are Abidjan, Lagos, Luanda, Lobito, Namibe and Walvis Bay. For instance, Pointe Noire is a particularly important port for the trade of timber. In the southern and eastern coasts of Africa, the ports of Cape Town, Durban, Beira, and Mombasa are examples of good avenues to explore. Finally, Cape Verde (Praia and Mindelo) can be an interesting stop of the north-south routes and an efficient transshipment platform to supply West African ports.

Given the importance of cargoes from China and destined for West Africa and Brazil, the connections to South America should also be mentioned, and in particular, the ports of Santos and Suape in South America. The connection between the east-west and the north-south routes will primarily impact the ports and the hinterland of southwestern Europe, as the traffic density will increase.

Conclusion

To summarise the main points of this chapter, the Mediterranean Sea plays an important role in the global trade as it services routes between Europe and Asia.

However, it is much less useful for trade within European countries and neighbouring countries. The statistics of the European ports presented in the first part, allow a comparison between the north and south of Europe. Some examples of the previously presented largest ports in the Mediterranean are those of Morocco and Marseille. One of the objectives of the European Union is to shift a share of cargo from road to sea transport as put forward in the White Paper for the Transportation of the EU. The chapter aims to present a number of improvements that should help Mediterranean ports to develop their activities and thus to gain a larger share of the volume of goods transported.

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CHAPTER 15

A GEOGRAPHY OF RAIL, ROAD AND AIR TRANSPORT

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In the trade flows between continental Europe and the Mediterranean countries, the exchange of commodities and finished products has been growing in the last years, despite the inadequacy of transport infrastructure. The increasing importance of exports as the main engine of growth for most European economies is due to the economic and financial crisis and its negative effects on domestic consumption and investment. Exports have been following a generally increasing trend in many European countries and the Euro-Mediterranean region has become one of the major markets of destination for their industrial products, as well as for their direct investments[1].

As reported in the CASE-CEPS recent study on Economic Integration in the Euro-Mediterranean Region: "a deeper integration between the EU and the Euromed countries could lead to a significant growth of exports from the Mediterranean region to the EU. Some estimates indicate that exports to the EU and imports from the EU could triple or quadruple if Euromed countries could reach the levels of integration typical for the EU-15".

That is why the integration of all processes in the entire region, depends largely on the improvement of land transport infrastructure networks, the modernisation of ports and airports, the construction of logistics platforms and freight centres and the development of transportation and logistics. The two indices of logistics performance defined by the World Bank *Logistics Performance Index* and the *Transport Intelligence Emerging Markets Logistics Index* clearly show the under-performance of the Mediterranean countries, not only compared with the advanced economies, but also the most dynamic emerging ones. With few exceptions in Morocco and Tunisia in North Africa and Turkey, UAE and Qatar in East and Middle East, the rest of

1 - See the Map "Mediterranean Transport Infrastructure Network" in EIB (2009, p. 22) (www.eib.europa.eu/attachments/country/logismed_en.pdf).

the Mediterranean registers a low-ranking position, confirming serious weaknesses in transport and logistics.

Globalisation, transport, logistics and agriculture: a scenario

With globalisation the Mediterranean sea has become a transit point for the flow of goods that use the deep-water routes between Europe, North America and Asia, and the short-sea routes between Southern Europe, North Africa, the Near and Middle East and the Caucasus. Trade relations between Europe and the Far East and China, primarily involve containerised imports of manufactured goods. They have become increasingly important compared to trade relations with North America and any other region of the world. In recent times, i.e. since the end of the war and the re-opening of the corridors crossing the Balkans, the Black Sea has emerged as the centre of a particularly dynamic economic region with the ports of Constanta (Romania), Odessa (Ukraine) and Novorossiysk (Russia) playing a key role in the transport and logistics of an area stretching from central and eastern Europe to Russia.

The Mediterranean sea has many features but its position as a hub of three continents, Africa, Europe, Middle East and Central Asia, is probably the most important one. In Europe, the continent's economic centre has continued to move eastward in the last two decades, especially after the accession of the Eastern European countries.[2] In the south, Turkey and most North African countries have achieved excellent results in terms of economic performance. The Middle East, and the oil-exporting countries in particular, have not only grown at a rapid pace, but they also demonstrated a great ability to invest heavily at home and abroad in new transport and logistics infrastructures: ports, airports and railways. Their economic influence is particularly significant in many Arab countries, from Morocco to Egypt.

Regarding maritime transport, the network of Mediterranean ports is benefiting from the low steaming strategy introduced by the shipping companies as a reaction to high oil prices and the reduction of traffic. The implementation of this strategy has added five days to ship rotations serving ports in northern Europe, making southern European ports more convenient, provided that all the necessary infrastructure investments are completed shortly. In a situation where the economic centre of gravity has shifted eastward, the northern ports of the Adriatic, in particular, can offer shorter routes from Asia to eastern and central Europe.

Ports are not the only beneficiaries of the new Mediterranean centrality. Land corridors also play a major role in connecting production and consumption markets of the three continents and within each continent, between the coast and the hinterland. Around the Mediterranean and the Black Sea, many landlocked countries consider ports and their related corridors as strategic gates for their exports. Austria, the Czech Republic, Hungary, the Slovakia and Switzerland in Europe; Kosovo, FYROM, Moldova and Serbia in the Balkans; Azerbaijan, Kazakhstan and Turkmenistan in the

2 - The last one being Croatia, on 1 July, 2013.

Caucasus; Jordan, Iraq and Iran in the Middle East, Chad, Mali and Niger in Africa have all a common interest in developing better infrastructure links to Europe and the Mediterranean Basin.

The situation varies considerably from one Mediterranean country to another. The adequacy of transport infrastructures and services differs from France, Italy or Spain and Morocco, Egypt or Turkey. Their number of ports and airports with efficient road and rail links is still limited, while in Europe, the port of Marseille, for instance, offers up to four modes of freight transport including river, rail, pipeline and road.

The Mediterranean scenario will probably evolve over time as a result of a number of factors that could affect, either positively or negatively, the freight traffic passing through the region in the near future:

- The enlargement of the Panama canal and the changes it can induce on the maritime routes between Asia, Europe and North America, which will likely affect the distribution of traffic between the Mediterranean ports, in favour of the terminals of Tanger-Med and of Port Said and Damietta;

- The significant expansion of merchandise trade between the Far East (mainly China), sub-Saharan Africa and Latin America via the Cape of Good Hope, which draws new routes that may diminish the importance of the Mediterranean sea in world scenarios;

- The Euro-Asian land-bridge either through Russia and China or through China and Kazakhstan with the consequent growing centrality of Germany and of the central and eastern European countries in response to the problems of maritime piracy, traffic congestion and increasing costs of the Suez canal and the effects of slow steaming. The German, Russian and Chinese railways have already developed services along the Trans-Siberian corridor with a much shorter transit time compared to maritime transport;

- The new Arctic route, the global climate change and the subsequent reduction of ice around the North Pole offer new opportunities for freight between Asia, Europe and North America. If this trend continues, both the Northern Sea Route and the Northwest Passage can ensure a considerable reduction in transit time (-40%) between the Far East and Western Europe, moving the maritime transportation axis of the European continent to the North.

Ports and land corridors in the Mediterranean connecting the centres of agriculture production in the southern countries to the European market are essential to the European food supply system. Spain, one of the largest European producers and traders of fruit and fresh vegetables, cereals, wine products, meat and fish is also a transit country for agricultural commodities coming from North Africa (especially Morocco, but also Tunisia and Algeria) and shipped to western and central Europe and vice-versa, by road or by Ro-Ro services via the ports of Algeciras, Valencia, Barcelona, Marseille, Savona and Genoa.

Land transport corridors from West to East along the Spanish and the French coasts of the Mediterranean sea are limited by two natural bottlenecks i.e. by the Alps and the Pyrenees, forcing trade flows to transit through a limited number of routes, often through narrow valleys, limiting the traffic performance both for freight and passengers.

Although freight shipping accounts for a major share of total exchange of goods between the Iberian Peninsula and the rest of Europe, a large volume of goods (47%) circulates through inland corridors crossing the frontier between Spain and France, through Biriatou on the West and Perthus on the East. The transit across the border is dominated by road transport (more than 97% of total). Road freight traffic is concentrated only on few congested major areas, daily frequented by almost 18,000 lorries, 4,200 of which transporting foodstuffs, accounting for a quarter of all goods in transit.

In the last two decades, in Spain and France the increasing demand for the transportation of agricultural products is fuelled by the need to establish connections between agriculture production sites, located mostly in southern European countries such as Spain, Portugal, France and, to a lesser extent, in southern Italy, and the rich urban consumption areas in the rest of Europe. The Spanish motorway network links agricultural regions (such as Almeria and Huelva) and the major seaports of Valencia, Algeciras and Barcelona with the European motorways, forming an extensive road network throughout the whole country. Along these routes, the volume of truck traffic passing via the Pyrenees has been increasing in recent decades.

The importance of the development of corridor infrastructure and services

Corridors are fully operational when all players, from shipping companies to freight forwarders, surface haulage carriers or rail operators, work together to achieve a competitive environment in terms of time and cost. Corridors should therefore not be seen as mere infrastructure, but as routes made of real freight flows. In the last two decades, for example, hundreds of small and medium French, Spanish and Italian manufacturing firms have decentralised their production, investing in Morocco, Tunisia, Algeria, Egypt and Syria in the leather and shoes, textile and garments, agro-food industries, etc. The demand for freight transport generated by these investments resulted in the creation of new corridors and new logistics services. Stakeholders and policy makers should learn from cases like these and select corridors in which it is necessary to invest, depending on the traffic they are able to attract. Priority should be given to corridors, which cross or serve major cities and metropolitan areas or industrial districts, headquarters of large companies and multinationals, etc. This hierarchy should be based on social and environmental considerations. Multinationals like IKEA, Monoprix, Walmart or car manufacturers like Mercedes, Renault, etc., which are known for their transportation needs, in the organisation of their supply chains, are very sensitive to intermodal transport solutions, choosing the "greenest" ones. "*Go Green*" initiatives have been developed by transport and logistics multinationals like DHL, with the aim of enhancing their

corporate brand and image by reducing their carbon footprint through the immediate reduction of carbon emissions.

From the point of view of the final user, whether a manufacturer/producer or a forwarder, the choice between different transport corridors can be determined by costs as well as service reliability, affordability, time, etc. According to the World Bank, 15% to 20% of import costs in emerging countries are associated with transportation, against about 5% in developed economies. In many industrial sectors, the sum of transportation, transaction and logistics costs may reach up to 35%-40% of the retail price of goods.

In general, a corridor is competitive when characterised by a high degree of vertical integration minimising transactions costs, when offering more than one mode of transport. The Logistics Service Providers (LSP), for instance, are very sensitive to delays due to entry or customs issues or extra charges they can be required to pay, as they reduce the corridor's competitiveness. In many emerging countries, customs clearance procedures at certain points of entry can take weeks, and this seriously compromises the reliability of the estimated time that it takes for a cargo unit to reach its destination.

In this context, the choice between different corridors is based on factors like reliability, safety and security, unexpected delays, etc. and not only on distance, average speed or quality of intermodal services at terminals, as it is usually the case in advanced economies. This is why LSP end up playing a key role in the organisation of global value chains. Well accustomed to local "customs and traditions" in transportation matters, global providers are able to provide an adequate service to foreign customers. Their role as vectors of integration becomes a crucial factor in supporting economic and social cohesion within the emerging Mediterranean countries, as well as between them and Europe.

The full integration of North African and Near and Middle Eastern corridors into European and Balkan networks is a major task that can only be achieved through significant improvements in both infrastructure and services.

Box 1: At the end of the corridor: food transport in urban areas

At global level, population is increasingly concentrated in cities. In Europe, around 75% of the population lives in urban areas and it is estimated that this percentage will increase up to 80% by 2020. At the same time, the quality of life in cities is declining due to limited access to available goods and resources and to increasing urban pollution that includes the degradation of air quality, excess waste, noise, and lack of greenery. World cities are thus competing to make their urban areas attractive to live and to invest in, by ensuring access to resources, services and goods to the communities.

Urban freight transport, also called city logistics, plays a vital role in sustaining modern urban communities, but it is also known for its unsustainable impacts, especially for its negative effects on air quality and traffic. In fact, road transportation, which is almost the only mode of transport for urban deliveries, is the most

polluting per unit of distance travelled. The small scale distribution of goods in an urban environment, that is referred to as "last mile logistics", is one of the most important and yet problematic aspects of the supply chain, due to the strong dispersion of food outlets and their increasing requirements (e.g. frequent deliveries, short time). However, the lack of efficiency of the urban freight movement has the direct consequences of increasing air pollution.

In terms of transportation performance, the urban food supply system in European cities entails the use of a large number of commercial vehicles operating below their maximum carrying capacity, with a high frequency of empty trips. Most urban food deliveries are operated by old diesel vehicles, e.g. small trucks and vans, which usually consume large quantities of fossil fuels whose emissions (CO_2, PM, VOCs and NOx) are higher than those of gasoline engine vehicles of the same category.

This scenario makes it urgent for local governments to develop urban policies focused on a review of the food chain on the basis of new types of socio-economic and environmental relationships between producers, retailers and consumers, from an "urban food planning" perspective. Some cities in Europe (Parma, Italy) and in the United States (San Francisco, California) were able to develop an effective logistics solution focused on the role of wholesale produce markets. These platforms can even become gastronomic hubs, in order to optimise and consolidate urban food deliveries, ensuring the interaction of local and global suppliers with urban consumers.

Connections between the European Ten-T network and its extension outside the EU

For many years, the European Commission has given a special attention to the development of the Ten-T transport network outside the borders of continental Europe, in an effort to create a common transport market, "opened to the rest of the world", especially to Africa, Asia and the Middle East in particular. In southern Europe and the Mediterranean, three major axis have been identified: 1) The sea motorways linking the Baltic, the Mediterranean and the Black and the Caspian Seas, and their related central axis to Ukraine and Russia; 2) The southeastern axis, linking the EU with the Balkans, Turkey, the Southern Caucasus and the Caspian Sea, and beyond towards Egypt and the Middle East; 3) The southwestern axis, connecting south-west and central Europe, Poland and Austria to Spain and Portugal to North Africa.

The overall objective of this extension is to reinforce the interest and the commitment among all the neighbouring countries, strengthening their economic and trade relationships. The identification of a number of priority areas has facilitated political dialogue, and, more importantly, it has led many governments to introduce innovations in their transport policy, to invest in new infrastructure and establish service standards (safety, financial and environmental accessibility, cost-efficiency ratio), usually modelled on European standards. Given the wide range of social and historical contexts characterising the region, from the Urals and the Arabic deserts to the Atlantic ocean, the strengthening of regional partnerships helped define each axis according to the specificities of each sub-region, in a joint effort to optimise the

use of different modes of transport, road, rail, river, short sea shipping and air, according to the characteristics of each territory and the needs of the carrier.

In the identification of the neighbouring countries' central nodes to be connected to the EU Ten-T network, ports and airports play an essential role as "gateways". This is especially true for countries that have assumed a growing importance in the international economic arena. In Marrakesh, Casablanca (Morocco), Cairo, Alexandria (Egypt), Aqaba (Jordan), Dubai (UAE) and Doha (Qatar), airports and ports are investing heavily in new infrastructures as the flow of passengers and freight between the Mediterranean and Europe are increasing over time.

In the process of further integration between Europe, the Mediterranean and the future member states in the Balkans, many investment projects in road and rail corridors supported by the Ten-T framework are concentrated in the eastern and southern parts of the continent. Thanks to the growing importance of its economy and the size of its population, Turkey is by far, playing a major role in the region.

In eastern Mediterranean, from Turkey to the Black Sea

The central role of Turkey is due to its geographical position, at the crossroads of two continents, and also to its demographic and economic dimension and current and future prospects in terms of GDP.

From a geo-political perspective, Turkey has so far proved its ability to deal effectively with very different neighbouring countries such as Bulgaria, Georgia, Syria, Iran, Romania and Ukraine. Its political importance has grown recently, because the country has managed to become a counterpoint to the growing instability in neighbouring countries such as Syria and Iraq. Transport and logistics are among the primary indicators of the increasing role of its economy over the Mediterranean. Turkish ports and airports (Istanbul is by far the most important) are growing at a rapid pace and, perhaps more importantly, some major transport companies like Turkish Airlines, are playing a key role at international level. In the haulage sector, the Turkish transportation firms are rapidly internationalising, following the constantly growing trade flows between Turkey and Europe along the corridors of the Balkans and the short sea shipping in the Adriatic and the Tyrrhenian Seas.

Above all, the importance of Turkey in the context of the Ten-T network stands from its direct land connection with the rest of the European continent, and with the "core" countries in western and central Europe: from the Roman *Via Egnatia* connecting Brindisi to Istanbul, through the cities of Igoumenitsa and Thessaloniki in Greece, to the corridor IV from Dresden-Nuremberg in Germany down southward to Constanta on one route and to Istanbul, on the other. In fact, Germany is the most important trade partner of Turkey in Europe, for reasons that go well beyond their trade relations (it is estimated that about 5% of German population is Turkish or of Turkish descent), followed by the other major European countries, such as France, Italy and the UK. Freight connections between the EU and Turkey

take place mostly by short sea shipping services on the route to the Adriatic ports, but also along the pan-European corridors crossing the Balkans (mainly corridors 4, 7, 8 and 10). Air cargo plays an important role in connecting Turkey not only with Europe, but also with the Middle East and Asia[3].

Unlike Gibraltar and the Suez Canal for the Mediterranean Sea, the Bosporus is the only entrance from the Mediterranean to the Black Sea and all the maritime traffic coming from and going to the ports of Constanta, Odessa and Novorossiysk moves across the European and Asian parts of Istanbul, passing under the Fatih Sultan Mehmet bridge, located on the Trans European E80 motorway between Edirne and Ankara.

Box 2. The Marmaray Project in Turkey

In october 2013, the Marmaray Rail Tube Tunnel has become a reality and therefore, the commuter Rail Mass Transit System in Istanbul is one of the most important not only in Turkey but perhaps in the entire Eastern Mediterranean. The project is a typical example of intervention in a strategic node of a highly complex transportation system, where the interests of local citizens to solve domestic traffic problems are in harmony with those of a nation and an entire region. The idea of a railway tunnel under the Istanbul Strait was first raised in 1860, but it was impossible at the time. The desire to construct a rail mass transit system connecting West to East passing under the Bosphorus Strait began to assert itself in the early 1980s and the first feasibility study conducted in 1987, concluded that such a connection would be feasible and cost-effective. The route originally envisaged is also the one adopted for the real project. Today, the Bosphorus Strait is one of the most busy and congested canals in the world. Congestion is affecting the sea and perhaps even more seriously, the city's roads and railways. The new underwater rail tube tunnel is about 76 km long, from Halkah to Gebze and will pass at a maximum depth of approximately 55 m.

According to the conclusion of the 1998 studies on trends and forecasts of demand, the project offers many advantages to the citizens of Istanbul, greatly reducing the growing problems of congestion caused by the cumulative flow of local and international traffic. In 1999, the Republic of Turkey and the Japanese Bank for International Cooperation (JBIC) signed a funding agreement, forming the basis for the financing of the section crossing the Strait of Istanbul, representing some 35% of the total costs of the railway project. The Marmaray Project's main objectives are to relieve existing operational issues on the main railway services between Asia and Europe, providing an uninterrupted passenger and freight transportation across the Istanbul Strait and to increase capacity, reliability, accessibility, timeliness and safety on the commuter rail services, reducing congestion and pollution and improving the air quality in Istanbul.

Before its construction, it took more than three hours to go from Halkalı to Gebze, including the ferry trip from Sirkeci to Haydarpaşa. Now that the new commuter rail system is in place, it takes no more than 1 hour and 45 minutes. This improved efficiency has repercussions on the general transportation pattern of Istanbul. According to the local authorities in Istanbul, from 2013, the percentage of trips made by train and subway may rise from the actual 3.6% to about 28%.

3 - See maps corridors on the European Commission's website, DG Mobility and Transport (http://ec.europa.eu/transport/index_en.htm).

In the Black Sea, Greece, Bulgaria and Romania, three of the 12 members of the *Black Sea Economic Cooperation Organisation* (BSECO), have launched three initiatives in the field of transport, with the main objective of developing a better economic integration among all riparian countries. In brief, they refer to 1) The construction of a *Black Sea ring highway*; 2) The implementation of sea motorways; 3) The facilitation of procedures relating to road transport.

The three initiatives, and the first in particular, will have a strong influence on regional traffic flows of passengers and freight. The extension of the existing maritime links and/or the establishment of new ones between the BSECO countries will aim at promoting environmentally friendly intermodal services, improving transport safety and security, logistics solutions and, perhaps more importantly, simplifying and harmonising administrative and custom procedures.

Multimodal land corridors in North Africa and the Middle East

If compared with the European TEN-T network, the road and rail corridors crossing North Africa and the Near East, from Morocco to Turkey are still lagging behind. Within the region itself, there are large differences in both transport infrastructures and access to services between the Maghreb, and the Mashreq countries, with Libya bridging "the gap" between the two areas. In the Mashreq, the only corridor linking the European side of Turkey with Greece and Bulgaria provides continuity with the European transport networks. The previously mentioned Marmaray Project will greatly improve the situation. In the Maghreb, any proposed connection between Africa and Europe via Gibraltar should be considered unrealistic in the present economic context.

The current delay in the availability of adequate transport infrastructure linking the countries along the North African coasts is due to many reasons. Among them, political disagreements have certainly played a key role until recently, but things could take another turn in the future, following the recent upheavals of the uprising in Tunisia, Libya and Egypt. The collapse of the Gaddafi regime in autumn 2011 was by far the most important factor of change in the region and whose full repercussions are difficult to predict. From an economic point of view, the construction of new infrastructure linking the countries along the East to West coastline has never been justified by a sufficient transport demand, in conjunction with significant trade flows. In fact, the degree of economic integration (and hence, trade) between North African countries remained low so far and the largest share of external trade flows was destined to Europe in the context of a North – South relationship[4]. It is therefore not surprising that the limited public resources have been allocated primarily to ports and airports, the only "entry point" of a country. Recently, however, Algeria, Morocco and Tunisia have started investing heavily in a domestic land transportation network. In the South, the Maghreb countries are separated from the rest of Africa by a natural barrier (the Sahara desert), and the few roads that cross the Sahara are

4 - Intra-regional trade among the North African countries has never been higher than 10% of total trade for decades.

often non-driveable, or considered dangerous because they are infested by kidnappers, or cross areas of civil war, like, recently, in Mali.

In the East, the Mashreq countries from Turkey through Syria, Jordan, Lebanon and Israel to Egypt, although characterised by a much more fragile (and complex) socio-political situation, can be considered, at least in terms of transport, as a more integrated block than the Maghreb countries. The area has historically been a crossroad between Africa, Europe, the Middle East and Asia. Passengers and goods coming from the Arab Peninsula can (or should) have easy access to the Black sea and to the Mediterranean coasts on their way to North Africa and Europe, without having to "pay the bill" of the Suez canal. Since 2011, the region has been afflicted by the civil war in Syria and the aftermaths of the Arab revolution in Egypt. Besides, the still critical situation of Iraq and the political isolation of Iran, coupled with the endless, symmetrical isolation of Israel, which have direct effects on transport and logistics, especially for Egypt in its relationships with the Mashreq and the Arab countries. Despite the fact that the political situation does not favour regional integration in terms of transport networks and related logistics services, the area has a huge potential for raising capital for investment in infrastructure, especially from the oil-producing Arab countries. In the last two decades, the Emirates, as well as other oil-producing countries, made huge investments in transport infrastructure, mainly ports and airports, in an effort to diversify their economies, exploiting their favourable geographical position on the routes between Asia, Europe and Africa. They not only have the financial capacity, but also a strong geo-political interest to participate in the process of the regional economic integration, playing a strategic role in the construction of a multimodal infrastructure network that goes from the Near East and the Arabic peninsula to Morocco via North Africa (see the box below for more details).

The situation of the national road network across the region is positive and likely to improve further in the near future. Nevertheless, these networks have a number of weaknesses including incomplete motorway networks crossing urban centres, especially in metropolitan areas, where long distance truck transit traffic mixes with regional and local passenger and light freight traffic; unavailable, incomplete or unfinished ring roads; inadequate motorways linking the major cities of the same country. For these reasons, the risk of congestion will soon become a problem if the economy keeps on growing at the steady pace and if infrastructure investments are not carried out on time.

Regarding rail transport, all Mediterranean countries have a national rail network (with the only, important, exception of Lebanon), but international cross-border connections are limited or inefficient due to lack of infrastructure and related services. Territorial continuity of rail services at Mediterranean level is almost inexistent, with few exceptions like Morocco, Algeria and Tunisia to the West, and Syria, Jordan and Turkey to the East. Besides, there are currently no connections operating between Egypt and Israel and between Syria and Jordan, while services between Syria and Turkey and between Syria and Iraq are currently suspended. The lack of connections between Tunisia and Libya, and between Libya and Egypt, does not allow for the establishment of international long distance services from Morocco to Egypt. Train

lines are in most cases not electrified and have serious operational problems. However, there are no capacity limits with few exceptions in Turkey and in Egypt. The lines are mainly used for regional and intercity passenger trains linking the main cities within the same country. Freight trains are most exclusively used for bulk commodities between mining areas and seaports (phosphates and other minerals in Morocco, Jordan, Egypt and Tunisia). Rail container traffic is very limited, although investments are underway in Turkey, Morocco, Syria, Tunisia and Algeria to link international modern ports handling traffic from Asia to hinterland destinations. Unfortunately, many recently-opened container terminals have no rail links. Poor and inadequate connections between ports and rail networks limit the possibility to develop alternatives to road transport, especially in ports in landlocked cities, suffering from road congestion. This is particularly true in Casablanca, Algiers, Alexandria, Haifa, Haydarpasa (Turkey), Latakia and Beirut. Due to these limitations, coupled with problems of border crossing, government-imposed obligation to use national ports, etc., these ports are rarely used at international level. They operate mainly within their own country, in conjunction with their hinterlands, with the exception of those dedicated to transloading services.

Box 3: The Arab Railway Network

The Arab Fund recently financed and supervised an important study on the Arab Railway Network, conducted by the Consortium Italferr - Dar El Omran, following the decision taken in 2009 at the Arab Developmental, Economic and Social Summit. The study has recently been completed although the final version has not yet been published. It aims at providing a comprehensive strategic vision for the integration of rail networks in the Arab countries, which involves the reinforcement of interconnections between the various countries in the region, promoting regional cooperation and facilitating the flow of trade and tourism. The study identified the main axes of the Arab Core Railway Network (ACRN), the estimated future increase in passenger and cargo railway traffic, and determined the infrastructure needs for the construction of the ACRN, selecting the best options for regional interconnections when there were several. According to the results of the study, the Arab countries would need to invest around 90 billion dollars to add around 20,000 km of railway lines, in order to achieve integration between their railway networks. The study recommended that the works be implemented in three phases, with similar costs and containing almost the same lengths of lines.

Source: Arab Fund for Economic and Social Development, Arab Railway Network Study. Final Report, *2012.*

The Nile: from the historical river basin to a modern multimodal corridor

Transport is a never-ending problem in Africa. Establishing links between the Mediterranean and the rest of the continent is challenged by serious obstacles, due, not only to natural barriers (the desert), but also to deficiencies in infrastructure, poor and costly rail and road services and large uncertainties in transit time, with delays which in some cases might become unsustainable. High transportation costs have a serious impact on economic activities and on agriculture competitiveness in

particular, preventing countries from improving their export capacity. With regards to consumption, transport costs can represent between 50% and 75% of the retail price of all sorts of goods in many sub-Saharan African markets. Inadequate road networks and rail links hinder economic growth. The fact that African intra-regional trade accounts on average for only 13% of total trade, against 53% in emerging Asia, is also due to the high costs of transport and logistics.[5]

In this context, "natural" corridors, like the Nile, can be a strategic resource for a country, perhaps even for the entire continent. Following the green banks of the Nile is a relatively suitable solution to reach Sudan and central sub-Saharan Africa through the East. In Egypt, the transport sector and the logistics industry have always been a strategic component of the national economy. This is due to the enviable geographical position, close to the Suez Canal, but also and especially because of the Nile, the longest and one of the best waterways in the world. Even though 95% of the Egyptian population lives close to and by the river, today less than 1% of the goods are transported through it.

Among the reasons that justify a more efficient use of the Nile as a means of transportation, there is the need to save part of the enormous amount of public resources spent on subsidies to artificially reduce fuel prices for consumers (Egyptians pay 0.15 dollar per a litre of diesel). Increasing domestic consumption has made the Arab country a net importer of oil, forcing the government to increase subsidies in the energy sector which rose to 96 billion pounds (15.7 billion dollars) in 2011, almost twice the education budget, according to official data. Subsidising fuels has serious consequences not only on the public budget, but also on the activities of river and rail transport, the only alternatives to road transportation. The rail and river transport sectors lose money due to the artificially created competitive advantage in favour of the road transport sector. This advantage may be eroded only if the government starts cutting subsidies in order to fill the budget gap that is estimated at 11% of GDP, as reported by banking institutions estimates in Cairo.

According to Citadel Capital, a private transportation based in Cairo once fuel prices will not be subsidised anymore, it should take no longer than five years for the share of cargo transported by river to reach up to 15% of total traffic. Nile Logistics, Citadel Capital's platform for logistics, river transport and port management provides an interesting example of how the Nile could be used to provide door-to-door services for industrial and agricultural producers and traders in Egypt, Sudan and South Sudan, indirect services in Uganda, Ethiopia and Kenya. Almost alone, the company created a corridor across the Sahara and through East Africa, connecting the Mediterranean and the Indian Ocean, using railroads and rivers to transport goods for over 6,000 km[6]. In the last years, the company has invested more than 200 million dollars in 1,200 tonnes of barges, cranes, port and storage facilities. Currently, Citadel Capital is running 42 barges along the Nile and has built or refurbished seven river-ports between Alexandria and Aswan, mostly to ship commodities including grain, coal, slag and clay and in the future possibly containers.

5 - For more details, see the World Bank report "Africa can help feed Africa", Washington, 2012.

6 - According to the firm's calculations, 5 litres of fuel can carry 1 ton. of cargo 100 km by road, 333 km by rail and 550 km by boat.

In Sudan, Citadel Capital has signed a concession agreement with the government allowing it to use the network of the public railway company, and in South Sudan it already operates twelve barges that supply oil companies and the World Food Program. In Uganda and Kenya, the company has invested in the Rift Valley Railway, a line that dates back to the British colonial era and stretches over 2,300 km from the coast to the inland. These investments were made possible by the privatisation and liberalisation of markets once dominated by public conglomerates.

Reviving river transport along the Nile is not the only major project of intermodal transport in Egypt. The Nile river basin, and the dense population living along its banks are considered an opportunity to develop a 1,200 km long, road and rail corridor running from the Mediterranean coast to Lake Nasser, with twelve east to west branches of a total length of approximately 800 km, to connect the highway to high-density population centres along the way.

According to the authors of the proposal, the project would provide many opportunities for the development of new communities as well as agricultural, industrial, trade and touristic activities on a strip of 2,000 km west of the desert which extends parallel to the Nile. Branches of the main highway oriented to the east-west direction would connect it to the main centres of population, providing easy transport between major cities and large production areas in Egypt and beyond.

Box 4: A Euro-Mediterranean network of logistics platforms

Resulting from a study funded by the FEMIP Trust Fund, the Euro-Mediterranean Logistic Network (LOGISMED) is an initiative launched by the European Investment Bank (EIB) to develop the logistic sector in nine Mediterranean Partner Countries (MPCs), Morocco, Algeria, Tunisia, Egypt, Jordan, Israel, Lebanon, the Palestinian Territories and Syria. It envisages the creation of a network of Euro-Mediterranean Logistic Platforms (EMLP) anticipating the construction of a free trade area. The network will be based on a telecommunications system facilitating the exchange of electronic data between the users and by a network of training centres allowing the creation of a Euro-Mediterranean market of logistic specialists. The main objectives of LOGISMED include the possibility to facilitate trade flows among Mediterranean partner countries and between them and the EU, to improve the organisation of the transport and logistics through the establishment of public-private partnerships (PPPs). Logistics is generally underdeveloped in MPCs, lacking modern facilities, specialised enterprises and trained professionals. In all MPCs where FEMIP operates, governments have confirmed the need for logistic platforms. The underdevelopment of the sector is mainly attributed to the shortcomings of the education system. The long-term objective of the LOGISMED initiative is that of creating a network of Euro-Mediterranean Logistic Platforms, working according to common quality standards consistent with international best practices, the use of common protocols, notably for the exchange of electronic data and expertise.

Given the difficulty to mobilise public resources, the proposal has been submitted to the private sector, i.e. local, Arab and international investors. The aforementioned characteristics of the highway require the establishment of a private sector organisation responsible for the management of the road and maintenance, for the

management of the toll stations, providing emergency and maintenance services. Such an organisation requires a specific mandate and clear legislation stated by the Egyptian government, to ensure the economic feasibility of the project.

Developing air transport between Europe, Africa and the Middle East

In the trade relations between Europe, North Africa and the Middle East, freight is often transported by sea. However, a small but rapidly growing share is transported by air. Shippers generally require that shipments arrive at destination on time, undamaged and at a reasonable price, regardless of the mode of transportation. Sea and air are considered as two opposing options in the decision making process: maritime transport is inexpensive, air transport ensures speed and reliability, but at high costs[7]. Air freight is therefore important for high value added products, from electronic components to fashion garments and luxury vehicles, as well as perishable goods like sea-food, horticultural products, fresh fruits, cut-flowers, etc. For many emerging exporting countries in Africa, Asia and Latin America, this was a factor of strategic importance in allowing their agricultural products to be sold in lucrative markets in North America and Europe. In the case of Africa, the continent's emerging export capacity, infrastructure development and incoming foreign direct investments promote the growth air cargo, as evidenced by the dynamics of major airports in North and East Africa, from Casablanca and Cairo to Addis Ababa and Nairobi. Exports of fresh agricultural products and cut flowers play a key role in the activity of all the airports in this region.

Even in times of high volatility in the world air cargo markets, the Mediterranean and Middle East airports remain very dynamic, with a growth rate of +16.4% between 2006 and 2012. If Morocco is probably the only country in the Maghreb that has developed an air cargo system with interesting perspectives for future traffic growth, most of the traffic is concentrated in the eastern Mediterranean and, above all, in the Middle East. In the rest of North Africa, many airports are developing rapidly, mainly because of tourism, but freight flows are still limited.

The strategies adopted by major air carriers in the eastern Mediterranean and the Middle East reveal the importance of the region. The Partnership agreements recently signed between Emirates and Qatar Airways and between Ethiopian Airlines and South African Airlines, all aim to meet the growing demand for exports from North and East Africa to Europe, North America and the Middle East.[8] Based in Dubai, Emirates has increased cargo flights to Tripoli, Cairo, Djibouti, Khartoum and Lusaka and the company's projects for Africa in the next years are very positive. African carriers are also striving to take advantage of the new "Southern Silk Road", as some call the trade flows coming from India, China and the Far East to Africa and Latin America. Ethiopian airways handle all kinds of import

7 - Air freight tariffs are 4-5 times those of road and 12-16 times those of sea transport.

8 - Ethiopian Cargo Airline is an interesting example of a fast growing air company, investing heavily in all-freighters 777-200LR planes, as well as in airport hubs in Africa (Addis Ababa and Lomé), Europe (Liege) and Asia (Hong Kong and Mumbai).

and export perishable shipments in a cold storage facility in the Addis Ababa hub, with adjustable temperature depending on the nature of products (horticultural products and live animals, etc.). Anticipating the future growth of perishable cargo, the Ethiopian company launched a project to construct a new temperature-controlled cargo terminal, which would be operational soon. International carriers like DHL Global Forwarding increased their capacity in Africa and Middle East, working to develop airfreight between different African regions. European airlines like Lufthansa Cargo recorded strong growth, especially outside Egypt, Ethiopia and Kenya. Other carriers (Cargo Lux, Air France-KLM) are expanding their network in Africa since the decline in Asian demand and the saturation of other markets.

Air carrier investments in Africa continue despite the persistent problems and constraints of the continent. It is of utmost importance to be familiar with the country and to be there, given the continent's political instability. The infrastructure is inadequate and there is a lack of handling facilities and security, regulations and bureaucracy are excessive especially in customs clearance. There are many difficulties in terms of operations and they are likely to further reduce the very low margins of air freight and tipping operations from profit to loss even in markets that are growing steadily. A typical example is the many cancellations of cargo services in all North African countries following the riots during the socio-political uprising in Tunisia and Lybia. Among the reforms to be implemented, the traffic rights are essential to lay the foundations for the creation of a real continental integrated service network. Today, securing the 5th and 7th traffic freedom rights in the transactions between African countries must go through a long bureaucratic process, the contrary of what is needed to build a conducive operating environment for cargo airlines, especially when dealing with perishable agricultural products.

In the Mediterranean, the air cargo market is characterised by the presence of two nearby airport hub(s) system and three international airports, in Cairo, Istanbul and Tel-Aviv that are all close to each other. The first hub system in central and western Europe is composed of the airports of Paris, Frankfurt, Amsterdam, London and Luxembourg, whose importance goes far beyond their geographical position. In southern Europe, several regional airports are specialised on different origins and destinations around the Mediterranean, Africa and the Middle East. The most important of them are Madrid (360,000 tonnes of traffic in 2012), Milan (414,000 tonnes), Munich (290,000 tonnes), Zurich (430,000 tonnes) and Vienna (178,000 tonnes).

Table 1 - Air cargo* traffic of the international city airports in the Mediterranean and the Middle East (2006-2012, tonnes)

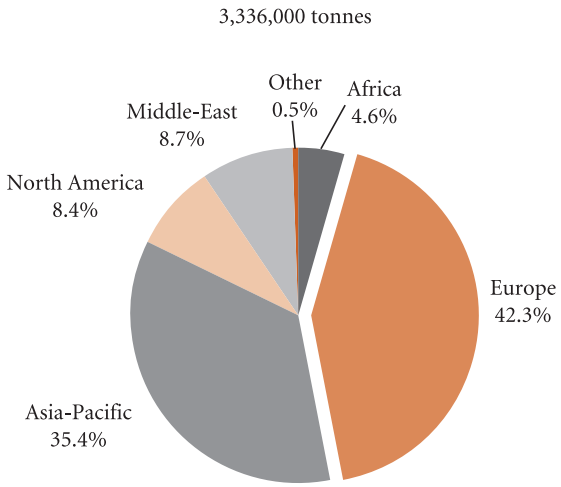
Regions	2012	2009	2006	Var.% 2012/2006	Var.% 2012/2009
Southern Europe	2,762,591	2,414,329	2,666,369	+3.6	+14.4
Eastern Europe & Balkans	1,095,839	959,825	927,069	+18.2	+14.2
Southern Med	891,508	881,749	874,162	+2.0	+1.1
Middle East	5,243,096	4,327,128	3,327,203	+57.6	+21.2
Total Mediterranean & Middle East	9,993,034	8,583,031	7,794,803	+28.2	+16.4

* Cargo = freight and mail.
Southern Europe: Spain, Portugal, France (Marseille, Lyon, Nice, Toulouse, Bale-Mulhouse), Germany (Munich and Stuttgart), Italy, Malta and Switzerland (Geneva and Zurich).
Eastern Europe & Balkans: Austria, Bulgaria, Croatia, Czech Rep., Cyprus, Greece, Hungary, Romania, Slovak Rep., Slovenia and Turkey.
Southern Med: Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Syria, Tunisia.
Middle East: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE.

Source: Elaboration of the author from various sources.

The second hub system, based in the Middle East, is by far the most dynamic and fastest-growing in the world, echoing the past history of the region, a crossroad between Africa, Asia and continental Europe.

Figure 1 - The air cargo market in the Middle East: origin and destinations



Note: 78% of trafic from/to Asia, Pacific and Europe.

Source: Boeing,"World Air Cargo Forecast 2012-2013", 2013.

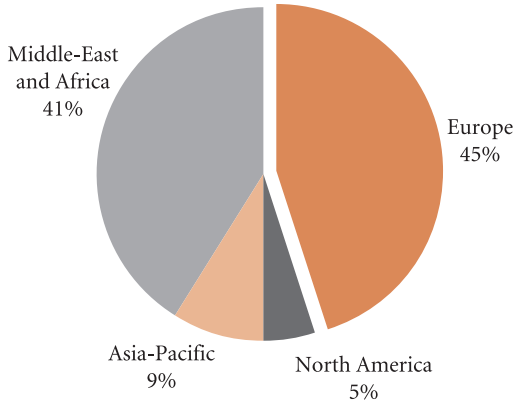
The system relies heavily on the airports of Dubai (2,3 millions of tonnes in 2012, +72% between 2005 and 2012) and Doha (Qatar) (827,000 tonnes, +253%), but also on those of Abu Dhabi (510,000 tonnes, +137%) and Sharjah (436,000 tonnes, +70%), in UAE. Dubai, in particular, emerged as one of the main gateways to Africa for Chinese companies that are increasing their shipments to the African continent. Recently, along the air routes connecting Europe and Asia, several airports in the Middle East have also become sea-air market hubs, where goods arriving from South Asia on ship continue their trip to Europe by air.

Transport of air cargo between the Middle East and Europe have increased by more than 9,5% in either direction from 2001 to 2011. Accounting for more than 1,4 million tonnes of air cargo in 2011, trade with Europe represented 42% of the Middle East's international air cargo market. The products most frequently shipped to the West are garments, perishable foods and cut flowers, while the main products that are transported to the East are telecommunications equipment, machinery and finished industrial goods.

The huge success of the Middle Eastern cargo airports is not only related to their strategic geographical position, but also to the fact that the national governments of many Arab countries, supported by Arab investment banks, regional institutions, etc., invested heavily in the region's hubs over the last two decades. For example, Al Maktoum International airport in Dubai opened to cargo traffic in 2010 and aims to become the world's largest cargo hub. It was not designed only as a cargo airport, but as part of a logistics district, made up of an integrated system combining different modes of land transport (road and rail), logistics services, manufacturing and assembly, all in a single free-trade zone.

In the Mediterranean, among the international airports of Cairo, Istanbul and Tel-Aviv, the Egyptian airport has repeatedly expressed its intention to become a passenger and cargo hub for the entire eastern Mediterranean region, in competition with the airports of North Africa and the Middle East, along the routes linking Africa, Asia and Europe. Between 2005 and 2012, freight traffic has grown by 42% to 330,000 tonnes. Programs are underway to increase its global competitiveness through the adoption of international standards and the gradual implementation of air transport liberalisation policies. Since 2004, the airport is managed by Fraport AG Frankfurt Airport Services Worldwide, a German transport company that also operates airports in Turkey and Saudi Arabia. In the air cargo sector, the Cairo Cargo City (CCC) provides delivery services of perishable goods to the terminal, and also closed cold chain services. The terminal, which covers an area of 24,000 m^2, is operated by Egypt Air and Horticultural Export Improvement Association that was founded to boost exports of perishable products from Egypt and from other African countries intended for final consumption markets in Europe and the Middle East.

Figure 2 - Regional distribution of Egypt Air Cargo (tonnes, 2010)



Source: IATA, Oxford Economics.

The Istanbul Atatürk International airport, which has grown at a rapid pace between 2005 and 2012 (+72%), reached 522,000 tonnes in 2012. Due to the significant results achieved over the last decade, the airport of the Turkish capital will soon reach its maximum capacity. Although the city can rely on a second hub, the Sabiha Gökçen airport, the country plans to build a third centre in the north of Istanbul. Turkish group won the tender and the construction of the new 22 billion airport will begin in 2014.

The Ben Gurion International Airport of Tel-Aviv is the only one to have recorded a negative growth rate (-10%) between 2005 and 2012, reducing its volume to 284,000 tonnes. The airport is the main entry for various categories of industrial high tech products developed in the country and plays a key role in the import and export of cut flowers and fresh fruits and vegetables.

Conclusion

The Mediterranean Sea has been recently defined as a sort of "compulsory passage" between riparian countries and a "transit area" dedicated to intercontinental maritime flows. This dual role is now threatened by the consequences of the Arab uprisings and the effects of the long process of political and social transition undertaken by many countries, from Tunisia or Egypt.

Despite this situation, Europe increasingly considers the southern and eastern Mediterranean countries as valuable trade partners and investment areas, given the size of their population and age structure, and the current and future potential growth of their GDP. In 2008, the evolution of the Barcelona Process from a Union *of* the Mediterranean to a Union *for* the Mediterranean implies the creation of a multilateral partnership covering a much wider heterogeneous area stretching from Portugal to Russia.[9]

9 - Passing from the "*Union of the Mediterranean*" to the "*Union for the Mediterranean*" has important political implications, as it involves a direct participation of the South-European partners, as well as all the EU countries, including Germany and the fast growing Eastern and Balkans ones.

The role of the Middle East and the Arab countries is also increasingly important in the area, given their political (and perhaps religious) influence, of course, but also the importance of the available financial resources, that could be invested in the energy and water, transport and logistics sectors where infrastructure can be improved.

In such a complex scenario, transport corridors and their associated logistics services are of an importance that goes far beyond their role in other geographical regions, contributing to the integration process in several ways:

1) Strengthening economic and trade relations with continental Europe, from industry and agriculture to services;

2) Attracting necessary financial resources for investments in infrastructure in the EU and in Arab countries;

3) Supporting and accelerating the growth of trade along the South-South corridors.

The Mediterranean coastal states are faced with trans-boundary challenges that first of all require a concerted action undertaken jointly by all the neighbour countries. Cooperation and integration in key sectors like transport and logistics do not only concern European or Middle Eastern partners. They have to be considered as strategic objectives for all governments, which must work together to develop a safer, more stable and more prosperous region.

In general, trade and transport go hand in hand, also promoting economic integration and reciprocal specialisation in product. Agriculture is representative of a sector where trade cannot evolve without very efficient, reliable transport and timing logistics services. The favourable climate, land availability and lower labour costs give the southern and eastern Mediterranean countries a competitive advantage in many agricultural sectors, including perishable products, cut flowers and fish products. Off-season agricultural production exported to Europe from the Mediterranean countries can take advantage of higher prices and, more importantly, lower tariffs and non-tariff barriers, favouring a greater sectoral specialisation on both Mediterranean shores.

Regional integration depends largely on the liberalisation of trade in the agricultural products sector accompanied by reciprocal preferential access to respective markets. However, liberalisation needs to be applied along the entire supply chain, from temperature controlled storage facilities to packaging and transportation, from farmers to final consumers. Making transport more efficient and reducing logistic costs can also contribute to increase significantly the share of income received by farmers, thus promoting a better distribution of income and a more sustainable development.

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CHAPTER 16

THE COLD CHAIN, A CRUCIAL LINK TO TRADE AND FOOD SECURITY

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Mediterranean populations have developed the first equipment of the cold chain since antiquity. The remains of coolers used in Roman times reveal their remarkable mastery in maintaining the cold chain, unequalled for centuries until the arrival of industrial refrigeration in the mid nineteenth century. However, it was not until a century later that modern tools as we know them today appeared. The first ventilated reefer truck making use of an independent group for vapour compression appeared in 1937 in the United States, and only in 1947 in Europe. The use of existing current insulators was only widespread and industrialised in the 1970's, paving the way for large-scale development of cold chain quality (Cavalier, 2011).

The Mediterranean is the cradle of the cold chain, and with Southern Europe, it has remained a centre of excellence in this field. With the development of trade in the region and the growing expectations of the populations in terms of quality and food safety, the area needs to be equipped with a quality temperature-controlled logistics service (allowing each product to be stored at the right temperature throughout its lifespan) worthy of its ambitions.

The current situation does not meet needs and expectations. However, even if some links in the cold chain are still lacking, both in terms of equipment, facilities and service, the situation is progressing rapidly, and projects are being developed. A network of players in the cold chain is being formed around the Mediterranean and governments have undertaken, and indeed have in part already achieved, the creation of a suitable regulatory and normative framework.

The growing needs of the cold chain in the Mediterranean

The cold chain is necessary to ensure food safety for Mediterranean populations, but also to allow for the development of food industries and trade, as well as developments in tourism.

The development of trade and industrial needs

Trade is developing rapidly around the Mediterranean and food exchanges between the European Union and Mediterranean countries are expected to double in number between 2000 and 2025 (De Rijk *et al.*, 2008). The trade of fruits and vegetables and processed food is increasing rapidly. Tunisia or Morocco export dates or citrus and import potatoes or bananas. The share of fishery in these trade exchanges is also significant. It represents more than 50% of food temperature controlled commodities exported by Tunisia. This also applies to pharmaceutical products which are often sensitive to changes in temperature. Whether in the case of fresh products, to be stored between + 2°C and + 8°C, such as vaccines, insulins or anticancer drugs, or the range of products to be maintained at ambient temperatures between + 15°C and + 25°C, as well as frozen products stored below – 20° C, and all the other ranges need to be maintained at specific temperatures. Their production, particularly that of generic medicines, has developed all around the Mediterranean, and their trade has not only increased enormously, but they have also completely changed over the last years. One should not forget the importance of veterinary vaccines for the production and for the sanitary quality of meat. Veterinary medicine needs the cold chain, and both the quality of meat and the reduction of production losses depend on good quality veterinary medicine. For instance, poultry vaccination campaigns against the H5N1 virus have undoubtedly helped prevent a global pandemic and a high mortality rate. This is also the case of many other animal vaccinations.

Exchange agreements with the European Union require the application of European safety regulations, in particular, requirements of the food hygiene package which among other things impose compliance with product temperatures throughout the cold chain. Mediterranean countries must therefore set up successful cold chain logistics in order to conquer European export markets, both for food products and pharmaceutical products that they are producing in greater amounts. It is to be noted that in Southern and Eastern Mediterranean countries (SEMCs), it is those firms or groups of players essentially focused on lucrative but demanding markets that have established the main elements of cold chain logistics. On the other hand, logistics are often less efficient when it comes to domestic markets, deemed “captive”, but may be tempted to prefer imported products due to their superior image, as is often the case of middle or high income consumers.

Box 1: The cold chain in Turkey

The Turkish economy has experienced considerable growth rates over the past decade, which has had a major impact on the purchasing power and economic activity in the country. In the food and beverage sector, both production and consumption rates have increased significantly during the same period. Similarly, there was a rise in the consumption of frozen and chilled foodstuffs. However, domestic consumption was limited due to the high price of frozen foods which remains unaffordable for a large number of Turks, and an overall reluctance to consume frozen and chilled prepared foods. Nevertheless, in recent years, consumer behaviour and awareness on prepared foods have changed due to increased income levels, more women joining the work force and more time spent on leisure activities than home-cooking. Similar to earlier observations made in other European countries, the number of fast-food restaurants and pastry shops has increased dramatically during the last decade, along with changing consumer habits. Another noticeable change seen during the last two decades is the proliferation of modern retail outlets chains throughout the country. They are considered as the driving force leading to the implementation of modern domestic cold chain systems.

Trends in the consumption of frozen and chilled food

The improvements in cold chain both in terms of quality and cost have also led to the emergence of various frozen and chilled foods in the retail market where there is a clear tendency to choose chilled ready-to-eat traditional foods (i.e. kebab, meze, dolma, etc.).

It should be noted that the above-mentioned trends in frozen and chilled food consumption are not identical in all regions of the country. In highly populated cities like Istanbul, Ankara and Izmir, consumers are more likely to eat frozen and chilled foods and more reluctant to prepare meals because more time is spent at work and in public transportation. Heavily dependant on cold chain systems, the expansion of the catering sector is primarily due to the increase in industrial activity where catering services are needed.

All these economic and social changes have had a significant impact on the cold chain system in Turkey. The most important impact was the one on the quality standards of logistic companies specialised in the cold chain. In the last decade cold chain logistic companies have modernised their structures and increased their capacity in order to meet the domestic demand for goods transported via reliable cold chains. As a result, the number of reefer trucks and large cold storage hubs has increased.

Progress to be made

As for the export market, modern cold chain systems were adopted much earlier. Turkey is a major fruit and vegetable producing country where traditional produce is foremost among frozen food products. Despite the striking change observed in cold chain quality throughout the past decade, there is still a lot of progress to be made in the domestic market where transport of fresh goods is mainly done without temperature control. Consequently, significant amounts of fruits and vegetables are lost due to inadequate temperature control during transport and storage while the remaining fresh produce reaching market shelves is of poor organoleptic quality. The lack of a reliable cold chain for milk collection in remote areas is still one of the major problems of the Turkish food industry. However, in recent years, some improvements have been made thanks to government subsidies allocated to milk producers applying cold chain practices. The logistics of fishery products is another problematic issue of the Turkish food industry in terms of cold chain

practices. Mainly artisanal fisheries suffer from the lack of proper refrigeration equipment due to the fishermen's lack of knowledge about the benefits of cold chain system and existing infrastructure. In contrast, industrial fisheries fully enjoy the latest technology in cold chain systems.

Perspectives and challenges in the years to come

Further improvements in the use of the cold chain in the various sectors of the Turkish food industry are expected in the coming years. One of the most important drivers that will shape the Turkish cold chain is undoubtedly the prospect of joining the European Union. The adoption of the ATP agreement by Turkey in 2012 is another important step that will gradually lead to a better cold chain. Among the priorities of the Ministry of Food and Agriculture, developments in the cold chain for fresh products are expected in the coming years. Comparable advances are also planned for fishery and dairy cold chain systems. All these improvements will require considerable public and private investment in the construction of cold chain infrastructure. Meanwhile, a major growth is also expected in the number and quality of services provided by companies in the field of cold chain logistics.

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Reduction of losses

The establishement of a quality cold chain also provides opportunities to reduce food losses. Such a reduction is all the more necessary since the needs of populations and industries will continue to grow in the future. Globally, today, the losses due to the lack of a cold chain amount to more than 30% and can even reach 40% in some developing countries, especially for fruit and vegetables. Yet, these losses represent a major source of savings and food to feed 9 billion people in 2050 and develop food industries and exchanges.

If the report of International Institute of Refrigeration (IIR, 2009) on cold and hunger in the world, published in 2009, unfortunately continues to be topical, it has contributed to raising political awareness. The French government has prioritised the reduction of food losses, and for several years, southern European countries have been requesting, within the framework of the Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be used for such Carriage (ATP)[1], an extension of the regulations on the transport of perishable foodstuffs to include the transport of fruits and vegetables. Their demand is also expanding to the enforcement of the regulations not only to international transport but also to national transport (a proposal has been submitted by France in this direction since the drafting of this chapter). At the same time, North African and Middle-Eastern countries are joining the ATP and implementing national regulations to develop a cold chain worthy of the name.

For the first time, the economic motivation for the regulation of the cold chain could be even stronger than the sanitary motivation. Even if the cost may be important, the savings achieved would largely compensate for the investment.

1 - United Nations Economic Commission for Europe Agreement (CEEONU or UNECE) signed in Geneva in 1970.

Evolution of consumption

Strong demographic growth and urban development accompany changes in lifestyle, consumption and distribution. Local distribution networks are no longer sufficient to feed cities, and short lifespan products are not appropriate to urban consumption. At the same time, supermarkets are developing in new areas. Their supply flow requires products with a longer lifespan and temperature-controlled logistics. No cold chain, no supermarkets.

Health of populations and tourists

All the studies carried out in countries that have set up a quality cold chain show a significant improvement in the health of populations, which remains the top priority for all governments and the main concern of the populations themselves. Mediterranean countries have the same demands, and a significant leeway.

Safety levels also have an impact on tourism, a major economic activity in all Mediterranean countries to the extent that their attractiveness depends in part on the safety that they are able to offer their visitors. Food poisoning due to a lack of or a breakdown in the cold chain is the most common annoyances, the most unpleasant and most unfortunate inconvenience for tourists visiting hot countries. The cold chain is therefore a crucial tool for the development of tourism across the Mediterranean.

The current situation for temperature controlled transport

Mediterranean countries share similar climatic conditions and face high temperatures, particularly in summer. These temperatures have a significant impact on product lifespan as well as on the storage or transport possibilities for certain fresh products. If the requirements in terms of temperature-controlled logistics are similar from one Mediterranean country to another, the current situations in the cold chain are highly variable.

Low levels of equipment

Cold-chain logistics around the Mediterranean suffer from a lack of equipment, starting with agriculture, for purposes of rapid storage at harvest time (see Monvoisin's cold tripod), right through to the consumer, via temperature-controlled storage, refrigerated transport, distribution and food factories. According to the United Nations *Refrigeration, Air conditioning and Heat Pumps Technical Options Committee (RTOC) Report* of 2010[2], with 4 million temperature-controlled land transport systems, the rate of global equipment was of 1 per 1750 inhabitants in 2010. However, this rate varies greatly from one country to another, and from one region to another. With 6,000 equipment vehicles in 2012, India only has one temperature-controlled transport vehicle per 200,000 inhabitants. With some

2 - UNEP, *Refrigeration, Air conditioning and Heat Pumps Technical Options Committee (RTOC) Reports*, Nairobi, UNEP (four-year United Nations report on the evolution of the ozone layer and carbon).

150,000 vehicles in 2012, France is within the European average with 1 vehicle per 450 inhabitants (The European fleet is estimated at 1,100,000 vehicles). If southern European countries are well equipped, southern and eastern Mediterranean countries are generally under-equipped. With only 5 to 6,000 vehicles in service in 2007, Tunisia has only one vehicle per 1,750 inhabitants, thus remaining within the global average.

The level of equipment in warehouses is also insufficient to meet the demands of temperature-controlled logistics both for the domestic markets of the countries concerned and for the development of trade between Mediterranean countries. IIR data show a strong heterogeneity for refrigerated storage facilities in the world including Mediterranean countries. For example Tunisia has tripled its refrigerated storage capacity over a period of 15 years, between 1996 and 2010, 70% of which is used for fruit and vegetables. With a park of approximately 1,500,000 m^3, of which 17% is used for frozen products, the country has about 140 m^3 per thousand inhabitants and approaches developed countries that have 200. However, this park's facilities are not very efficient in terms of energy as they consume more than 120 kWh per m^3 per annum and remain under-utilised with occupancy rates of 50 to 60%.

Box 2: Metrological tools: indicators, thermometers, recorders

There can be no cold chain without temperature traceability, and traceability requires the right tools. These have evolved considerably in recent years, integrating, in particular, new technologies, including biotechnologies and information technologies. Recorders using paper bands or disks have almost disappeared, giving way to electronic recorders or indicators.

Temperature recorders have become an indispensable accessory for cold rooms, warehouses and reefer trucks. The European regulation 37/2005 requires the use of temperature recorders througout the entire cold chain for frozen products, which must, since 2010, comply with the standard NF EN 12830, currently under review, and regularly checked according to standard NF EN 13486. In practice, checking is carried out before using the machinery and then every two or three years. Properly used, these recorders can demonstrate compliance with the performance requirements but also to prevent trade disputes. For the benefit of users, some countries offer a list of recorders (the one established by France is available on the website of the Ministry of Agriculture). Today, these recorders are integrated into devices tracking transport, the vehicle's position, the data of the refrigeration unit, energy consumption or the opening of doors. These systems provide a centralised way, not only to access the data's history, but also receive alarms allowing for preventive action.

Probe thermometers to measure product temperature are just as necessary in cases of doubt or disagreements during destructive product controls. Their legal metrological version is the tool of control services, but it is also that of controls at the interfaces between professionals. Even though probe thermometer technology has little evolved, methods of control have undergone important changes within the European Union. Their use still needs to be developed in all countries. Thermometers must conform with the standard NF EN 13485 and be checked regularly, like temperature recorders, according to standard NF EN 13486.

Finally, indicators and integrators of temperature, which allow for simple monitoring of compliance with the cold chain by operators, have evolved and developed greatly over the last years. Their price has fallen dramatically, allowing for a wider use of these tools, particularly in the cold chain of health products. Electronic indicators derived from recorders are now used alongside chemical, biological, microbiological or mechanical indicators. They are simple to use and their cost is low enough to envisage, in the mid-term, their use on all products, for example on vaccines. Their use should become more widespread in the coming years.

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The cold chain is not only limited to warehouses and means of transport. Product quality is primarily guaranteed, according to the principles of Monvoisin's cold tripod, by early cold. Agricultural stocking equipment is just as important as efficient equipment in industrial or traditional processing units

Statistics show a clear link between the level of facilities thoughout the chain and the level of food losses. IIR data, published in its note on "The Role of Refrigeration in Worldwide Nutrition" (IIR, 2009), completed with data on transport facilities by Cemafroid, confirm this (see Table 1).

Table 1 - Rates of equipment for the cold chain and level of worldwide food waste

	World	Developed countries*	Developing countries**
Population			
Population in 2009 (in billion inhabitants)	6.83	1.23	5.6
Rate of cold chain equipment			
Volume of refrigerated storage (m^3 per 1,000 inhabitants)	52	200	19
Number of controlled temperature transport vehicles (in units of one million)	4	2.73	1.27
Number of controlled temperature transport vehicles (number of inhabitants per unit)	1,708	450	4,421
Number of domestic refrigerators (per 1,000 inhabitants)	172	627	70
Rates of waste			
Waste*** of food (all products) (in%)	25	10	28
Waste*** of fruit and vegetables (in%)	35	15	40
Waste of perishable commodities due to a lack of refrigeration (in%)	20	9	23

* More developed areas (according to the definition of the United Nations).
** Less developed areas (according to the definition of the United Nations).
*** The loss rate indicated includes post production waste, i.e. during processing, storage, transport and retail. This rate does not, for various reasons, include final losses at consumer level: this is particularly difficult to evaluate; this level of waste is significantly less dependent on the level of refrigeration facilities than post production waste, as, in industrialised countries that have a high level of equipment, the share of inefficiencies linked to waste increases considerably.

Source: IIR (2009) and data from Cemafroid for transport (2011).

Cold chain quality and practice

The climactic conditions around the Mediterranean require the use of quality equipment. However, the sanitary control authorities and users alike have commented on the lack of certain materials and equipment whose performance levels have unfortunately been sacrificed for price considerations. This is the case for both transport equipment and storage capacity.

These levels of performance are not enough to guarantee cold chain quality. Equipment requires proper maintenance and therefore a follow-up by competent and committed personnel. On the one hand, equipment reliability has improved enormously over the last sixty years, whereas on the other hand, the professional competence and personal conscience of the personnel have become the weak link in the cold chain at all levels. The regular maintenance of these facilities is still inadequate.

However, the best solutions and best equipment, even well-maintened, are not enough to guarantee cold chain quality if they are not used wisely. Their operation requires fully trained and skilled personnel throughout the chain. Bad habits are numerous: poor product loading, problems in temperature setting regulations, overloading of equipment, deficient closing doors, obstruction of blowing devices or extract air vents, non-ceasing refrigeration during the delivery to avoid icing... and so on. These are the poor practices that are the main cause for the failure of the cold chain, in particular during loading, unloading, delivery, stocking, etc.

Perspectives for logistics and for temperature-controlled transport

The establishment of a cold chain concerns all the links. Agro-food factories as well as logisticians must develop the necessary tools and solutions. As we have seen, it is not enough to build warehouses, to buy and use trucks and to develop maintenance services. The implementation of logistics must also be accompanied by appropriate regulations and the training and awareness of personnel. Finally, monitoring and certification systems and services are necessary for the enforcement of the regulations are applied and to win the trust of consumers, operators and stakeholders, without whom the cold chain is difficult to develop.

Development of temperature-controlled logistics

Aware of the issues and the current situation of the cold chain, Mediterranean countries have started to develop networks of warehouses and transport logistics including temperature-controlled logistics. This is the case in Morocco, Algeria or Tunisia. Improving the cold chain for fresh products is also a priority for the Turkish Ministry of Food and Agriculture. Morocco has initiated an important project in this field: by creating logistics platforms across the territory, including temperature-controlled warehouses with positive and negative cold allowing the supply of the whole area and providing essential infrastructure upon which private, national or foreign operators can rely.

Like Tunisia, Morocco has also taken steps to implement the ATP in its territory and transform the provision of international transport to improve the quality of national transport (see Box 3). Both public and private providers specialised in cold chain logistics are being developed to meet the growing demand for temperature-controlled logistics for e.g. Polytrans or Guanter in Morocco. The main European players have also expanded their networks to other Mediterranean countries like STEF, the European leader in temperature-controlled logistics, which provides regular refrigerated links between Mediterranean countries.

Box 3: The ATP and its application in Morocco

The United Nations Agreement of 1 September 1970 relating to the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for Such Carriage (ATP) came into force on the 21 November 1976. It sets the minimum requirements for temperature-controlled transport vehicles used for international transports in signatory countries. It specifies the testing procedures, sizing and classification of the insulation and refrigeration performance of new vehicles, but also the verification of the performance of vehicles in service. The terms of this agreement state that all temperature-controlled vehicles ensuring the international transport of perishable goods within contracting states must have a technical compliance certificate (ATP certificate), and associated marking issued by the competent authority of the country where the vehicule is registered. The certificates are valid for six years and can then be renewed for periods of three years. The agreement also establishes a list of the perishable goods concerned.

The agreement is governed by the United Nations Economic Commission for Europe (UNECE, www.unece.org). Each country designates a competent authority in charge of delivering ATP certificates. The lists are available on the UNECE site. In France, this authority has been delegated to Cemafroid by the Ministry of Agriculture (www.autoritecompetenteATP.cemafroid.fr). Each country can also designate a testing station, a laboratory whose task is specifically to test new equipment and control the testing of equipment in service. Cemafroid is currently the official testing station in France. Not all countries have such a laboratory given the investment required to build it. The countries have also established a network of ATP experts or test centres for the re-certification of vehicles in service. In France there are more than two hundred such centres (Cavalier, 2008).

Originally created to ensure food safety, the ATP now also controls environmental performance (Cavalier, 2009). Its consumption measurements allow the user to compare the energy performances of different solutions, and its requirements in terms of insulation for energy saving.

After the ratification and signature of the ATP in 1981, Morocco integrated it into its national legislation by enacting the *Dahir* of 6 May 1982. Pending the publication of specific legislation, an interministerial circular (Ministry of Agriculture and Agrarian Reform, Ministry of Transport, Ministry of Public Works, of Vocational and Management Training) was published on 2 July 1993 for the implementation of the agreement.

Thereafter, pursuant to the *Dahir* of 6 May 1982, the decree of 5 January 1999 and the joint order of 30 April 2004 were published. These texts have established a national commission to review the applications of ATP certificate under the chairmanship of the former Department of Livestock (veterinary services), which from 1 January 2010 has become the National Agency for the Sanitary Safety of Food Products (ONSSA), the competent ATP authority. The ATP is payable on Moroccan

territory for all temperature-controlled transport vehicles unless there are specific derogations. The ONSSA delivers ATP agreements for new imported vehicles and renews ATP certificates for vehicles in service destined for international transport. For national transport, the office issues certificates of sanitary agreements during the transitional period.

Morocco is currently revising its national regulations and will soon establish an agreement or designation procedure for a test station and for test centres required for performance verification of the park in terms of temperature-controlled transport of perishable goods. The national park currently has about 2,520 vehicles in service, mainly trucks and vans. The park reserved for temperature-controlled transport for perishable goods has nearly 443 vehicles in service, belonging to 236 international road transport companies: 26% of these vehicles are less than 6 years old, 29% are between 6 and 9 years old, and 44% are older than 9 years. Most are semi-articulated trucks, classed FRC (class C mechanically refrigerated equipment with heavy insulation adapted to the transport of frozen or chilled products) in 95% of cases, and FNA (normal class A refrigerated equipment adapted only to the transport of fresh products) in 5% of cases.

Regarding cold warehouses, in accordance with the law 28-07 of 11 February 2010 on food product safety ("SSA Act"), in mid-2013, ONSSA has approved 24 temperature-controlled warehouses specifically for, among other products, butter, cold-cuts, imported frozen meat and gave 9 favourable opinions for the storage of fishery products.

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Regulatory changes

The development of cold chain logistics also requires appropriate and applied regulations, backed up by technical standards. Exchange agreements with the European Union require the application of European regulations that set performance requirements in terms of temperatures for the cold chain. These performance requirements will be even easier to keep if they are backed up by obligations of means. They will allow for the setting of simple objectives for minimum performance level of equipment easier to use by professionals.

In the transport sector, the ATP international regulations for cross-border transport sets requirements for easily satisfiable means both for new equipment and for equipment in use. Southern European countries have expanded (or are currently seeking to do so) the application of the ATP regulations to their national transport in order to ensure a quality cold chain suited to their climate conditions. This is the case of Morocco, that signed the agreement in 1981. The country is trying to develop its own regulations. Tunisia has also signed the agreement in 2005 and Turkey in 2012. Other Mediterranean countries, such as Algeria, are thinking of adopting it.

Draft regulations are being prepared or published to harmonise and improve other cold chain equipment. An example is the generalisation of the use of existing standards on recorders or thermometers.

The development of suppliers of suitable equipment and services

There can be no cold chain logistics without suitable equipment and services. The supply of local constructors' equipment or of imported material distribution networks has increased considerably over the last years. However, the insufficient enforcement of regulations, of their shortcomings, sometimes give way to cheap equipment but with poor performance. It is essential that the authorities provide control (Cavalier, 2008) and ensure that quality solutions, whether constructed on site or imported, are adapted to local needs. Although quality solutions are also sometimes more expensive, they should not be eliminated.

In recent years, manufacturers of equipment have developed all around the Mediterranean, e.g. SAFKAR, manufacturer of refrigerated transport groups in Turkey, COLDEQ and SIMPATIC, manufacturers of equipment for isothermal cells in Tunisia, or CECI in Morocco. Market leaders have also established networks of agents or agencies. Carrier Transicold or Thermoking, via their representatives, cover the whole world with their refrigerator group maintenance service point networks. Equipment rental facilities, service included, are also on the increase. The Petit-Forestier group, world leader in this field, specialised in temperature-controlled transport vehicles and refrigerated display cabinets, recently established itself in Morocco.

To respond to the development of the cold chain in Mediterranean countries, the range of solutions, equipment and services have yet to expand and mesh the entire region. It must also integrate the specific needs of certain regions, in particular remote, mountainous or desert regions, which require special conditions (taking into account the climate, transport time or road quality): refrigerator groups adapted to working conditions that are more extreme than the standard versions, with tropicalisation options; bodies adapted to greater insulation requirements for lower thermal losses, particularly on long haul routes; greater mechanical constraints on poor road surfaces.

Training and awareness-raising

The development of solutions will only be effective if it is accompanied by proper training of both professional and individual users. The consumer will always be the weakest link of the chain. He must constantly be aware of the need to respect the cold chain. Surveys carried out on the state of domestic refrigerators in French households show that this effort must always be stressed. It is even more important to raise this awareness in countries where the inhabitants are less well equipped, or not equipped at all, for it is at the beginning that habits, good or bad, are adopted.

In turn, professionals must know and understand the issues related to the cold chain, in order to incorporate them. Maintaining the cold chain's continuity must be considered as an opportunity and not as a constraint. This implies that the benefits incurred by a quality cold chain are shared between the various players and that cold chain logistics provide tangible added value for all players. The only savings

generated by the reduction of losses are a huge economic pool, but the benefits also have a bearing on product quality, which must be sought in order to lengthen sales time and therefore reduce distribution costs.

Finally, operators and personnel must all be trained to the proper use of equipment and good practices of the cold chain, ranging from the handlers to the site manager via quality control, technical and maintenance services, drivers, farmers, pharmacists... The cold chain is not only the domain of refrigeration technicians whose interventions are always limited to the installations and equipment. In both the health and food sectors, personnel involved in the cold chain must be well informed on this subject that is often forgotten in their basic training.

Clients must also be aware of the savings made possible by a careful choice of materials, the cost of using skilled professionals, both for the choice and the management of equipment. This effort is small when compared to the potential savings, a possibility that is too often under-estimated.

Box 4: Presentation of the International Institute of Refrigeration (IIR)

The IIR is the only intergovernmental organisation that gathers all scientific and technical expertise and independently disseminates all aspects of cold chain facts and information, from cryogenics to air-conditioning, through the liquefaction of gases, the cold chain, procedures and equipment for refrigeration, refrigerants and heat pumps. Member states, including most Mediterranean countries represent 60% of the global population. The main issues are food security, health, energy efficiency, global warming and the ozone layer. In this regard, the IIR has signed cooperation agreements with the United Nations Food and Agriculture Organisation (FAO), the United Nations Industrial Development Organisation (UNIDO), the World Health Organisation (WHO), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Environment Programme (UNEP), and it is an observer member of the Codex Alimentarius. The dissemination of knowledge is carried out by various means (meetings and congresses, guides and technical notes, a documentary database with about 100,000 references).

For further information: www.iifir.org

Conclusion

A quality cold chain is essential for the development of Mediterranean countries and their food and health product trade, but also for the improvement of the living conditions of inhabitants, as well as the support of the evolution of their life-styles and consumer habits.

Apart from a few successful export-orientated industries, existing services and equipment are insufficient. Only investments made by many countries and the development of regulatory and technical requirements will lead to a functional cold chain in the short and medium term. They must be accompanied by the development of training and awareness-raising of staff and consumers, and also the establishment

of a reassuring regulatory and normative framework for cold chain operators. All Mediterranean countries should be assured of rapid returns on their investments thanks to the savings achieved on the products and the improved quality thus generated.

Working towards the establishment of a quality Mediterranean cold chain is not and will not represent sunk costs investments, quite the contrary. Its implementation will help to support the development of agriculture, the food industry, distribution, tourism and the industries and services necessary for construction, management, maintenance and safeguarding of the cold chain. It will provide the Mediterranean with an opportunity to add value to its products and services and to create new employment possibilities[3].

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3 - This chapter was coordinated by the IIR.

CHAPTER 17

INFRASTRUCTURE, LOGISTICS AND AGRO-FOOD DYNAMICS IN TURKEY

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For a long time Turkey sought to promote a self-centred model of development. Things changed from the 1980s as the structural adjustment policies have led to the opening of the Turkish economy to the world market. After the new financial crisis of the beginning of the 2000s, the external and internal liberalisation was accelerated.

Located at the crossroads of three continents (Europe, Asia and Africa) with a total surface area of over 800,000 km^2 and surrounded on three sides by seas, Turkey extends from Minor Asia towards oriental Thrace for over 1,660 km. Endowed with a varied agricultural and productive wealth, the country is almost self-sufficient to feed a total population of 75 million and to export part of its national agricultural production. Its agribusiness appears as one of the sectors that mainly export towards Southern and Eastern Mediterranean countries (SEMCs), Countries of Central and Eastern Europe (CEECs) and Asian countries. Concerning imports, although Western Europe, the European Union and countries of the European Free Trade Association (EFTA) constitute one of the important "supply" zones, since the 2000s, the Balkans, Russia, Ukraine and Moldavia began to position themselves as first suppliers of Turkey in raw (RAC) and processed (PAC) agro-food commodities. Asia and even Latin America are gradually becoming privileged business partners of the country.

In this new structural configuration of the food-processing trade, Turkey is not disconnected from its Mediterranean neighbourhood. It is therefore interesting to analyse the evolution of commercial and other agreements that Turkey establishes with its Mediterranean and other partners as well as how this development affects the growth and extent of its transport and logistics sector. What are the infrastructural investments that Turkey has undertaken during the last ten years in order to achieve its goal of becoming the trade hub in the Mediterranean and enjoy its geostrategic advantage?

From a description of trade in Turkey from 1986 to the present day, based on the international trade statistics of the FAO, we shall firstly see how this evolution is built with the growing number of trade agreements between Turkey and its partners. Secondly, we will analyse in detail the transport and logistics sectors and finally discuss the infrastructural investments that the country is making in order to improve its transport networks and create the necessary conditions for the establishment of logistics platforms and villages, both strategic for the smooth flow of goods, services and information.

Turkey's position in the international agro-food trade

The position of the agro-food sector in Turkish international exchanges slightly declined between 1970 and 2010. According to Turkstat data[1], in 1970, the share of exports of raw food commodities in the country's total exports amounted to 6.1%, and that of processed food products to 7.1%. The agro-food sector including all exports represented 30 billion euros, i.e. 13.2%. This share fell to 10% in 2012 with a total export of 119 billion euros, all sectors included. The exports of raw food products showed the largest drop representing only 3.5% of total exports, all sectors included while the share of processed food products dropped to 6.5%. The growth in imports of raw or processed food commodities between 1970 and 2012 was spectacular. In 1970, the total value of imports, 59 billion euros, rose to 184 billion dollars in 2012. Imports of raw foodstuffs, which represented 3.1% of this total value in 1970, amounted to 3 and 6% in 2012, while the share of the transformed processed food products remained stable over the period (2.2% of the total imports in 1970 and 2012).

Despite this rather modest place in Turkey's international trades, the food sector ranks among the top ten exporters in the world for several different raw and/or processed[2] food products. According to FAO data, in 2010[3], Turkey was the largest world exporter of raisins, dried apricots and dried figs, the second largest world exporter of wheat flour, pasta, prepared walnuts, poppy seeds and lemons, and the third largest world exporter of concentrated apple juice, fresh apricots, yogurt, pickled vegetables, citrus fruit, lentils and cherries. Turkey is also among the top ten world exporters of fresh tomatoes, various preparations of cereals, table olives, tomato paste, industrial bakery and pastry products, cream cheese, margarine and virgin olive oil.

Our analyses[4] also show that Turkey widened its range of imported and exported products while diversifying supplier/customer countries/zones[5]. Figures 1 and 2 reveal that this diversification is both desired by public authorities and private actors to avoid being dependent on a single supplier country/zone or on a single customer country/zone. We indeed note that Turkey increasingly applies a strategy that favours South-South exchanges and orientates its exports towards the SEMCs, the CEECs

1 - www.tuik.gov.tr/disticaretapp

2 - Only raw or transformed processed foods products intended for human consumption are taken into account here. In accordance with the UN nomeclature, tobacco and drinks are included in this definition.

3 - Faostat (www.fao.org).

4 - For this analysis of Turkish international trade, we referred to the statistical data of the FAO presented in the trade matrices. These data are available for the period between 1986 to 2010. Our study thus focuses on a period of twenty-four years.

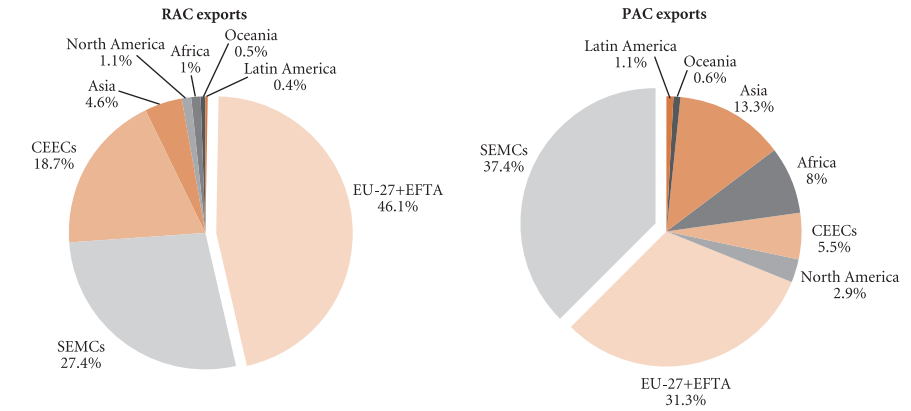
5 - For a thorough analysis of Turkey's relations with its Mediterranean neighbors, see Huber (2013).

and towards Asian and Latin American countries. With regards to imports, Turkey's main supply zones in raw and/or processed food products are the CEECs, North America, Asia and Latin America. It is interesting to note that although positioned first or second rank in the Turkish agro-food trade, the shares of western Europe (EU-27 + EFTA) are stagnating and even decreasing.

Turkey increasingly imports cereal, fresh fruit and vegetables, oleaginous, fodder and raw leguminous from the CEEC, African and Latin America countries. The CEECs, Latin America, North America and, in fourth rank, western Europe are Turkey's main suppliers in processed food commodities, essentially cattle food, edible vegetable oil and unrefined or refined sugar.

Turkey's raw foodstuffs, mainly fruit and fresh vegetables, tobacco leaves and leguminous are mainly exported to the SEMCs, western Europe and Asia. Followed by the CEECs and by Asia, these countries are recipients of Turkish processed foods commodities mainly derived from cereals (wheat flour, pasta, and industrial bakery and pastry products), non-alcoholic drinks, confectionary/chocolate products, refined vegetable oils and margarine.

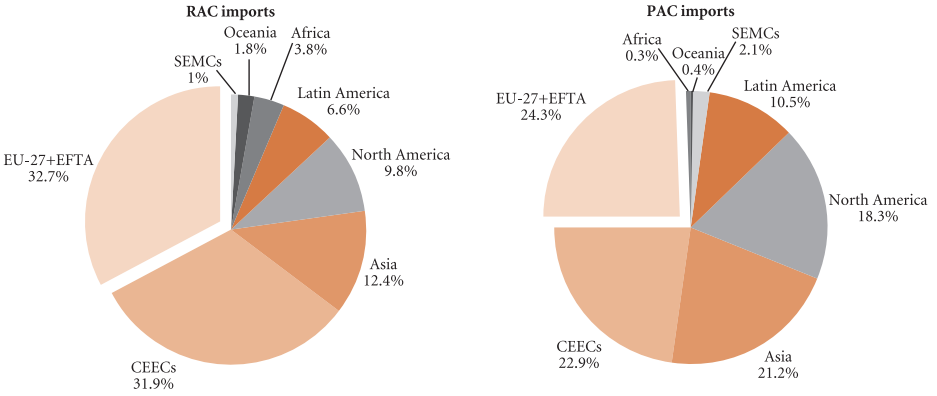
Figure 1 - Exports volumes of RAC and PAC from Turkey by main destination areas between 2001 and 2010



Note: Ten-year average.

Source: Adaptations of the author based on Faostat data.

Figure 2 - Import volumes of RAC and PAC by main exporting areas between 2001 and 2010



Note: Ten-year average.

Source: Adaptations of the author based on Faostat data.

In order to analyse the evolution of these exchanges, we calculated the average annual growth rate (CAGR) for the period 1986-2010 (see Table 1). These calculations reveal that central and eastern Europe and Asia, followed by Africa, are the most dynamic supply zones for raw agro-food commodities (RAC) as well as for processed agro-food commodities (PAC). Like the African continent and with rather high CAGR, Asia, Latin America and Oceania, stand out as recipient areas for Turkish processed agro-food exports and show a strong potential for future development. Despite the fact that Turkish economy is still closely linked to the agricultural sector, especially the agro-food chain, the growth trends for this studied twenty-four year period lead us to think that in a near future, a swing will work in favour of processed agro-food product exports, increasingly towards "southern countries".

Table 1 - CAGR of Turkish imports and exports between 1986 and 2010, by main "supply" and "customer" zones (in %)

"Supply/Customer zones"	CAGR of imports 1986-2010		CAGR of exports 1986-2010	
	RAC	PAC	RAC	PAC
CEECs	5.4	10.2	5.8	4.5
Africa	6.6	7.3	3.4	15.3
North America	0.8	5.7	– 1.0	3.2
SEMCs	5.9	4.9	1.5	3.3
Asia	9.0	3.3	2.1	5.2
Oceania	– 3.8	3.2	2.8	4.9
Latin America	0.2	3.1	3.6	5.0
EU-27 + EFTA	3.2	1.4	1.1	2.0
Total	3.1	3.5	1.9	3.5

RAC: Raw Agro-Food Commodities.
PAC: Processed Agro-Food Commodities.
Source: Adaptations of the author based on Faostat data (www.fao.org).

This trend will materialise and perpetuate over time thanks to the government's will to establish a vast network of bilateral trade agreements with the SEMCs (Huber, 2013). Turkey pursues this same geo-economical strategy with the CEECs and with Central Asian countries, the Black Sea and Asian countries (see Table 2).

Table 2 - 2011 Assessment of bilateral trade agreements between Turkey and the SEMCs

Countries	Free trade agreements	Economical, commercial, industrial, technical and scientific partnerships	Preventing double-taxation	Agreement on transport facilitation	Bilateral investment promotion and protection	Sea trade agreement	Road and air transport agreement	Tourism agreement
Algeria	X	X	X		X	X		
Egypt	X	X	X	X	X	X		X
Iran								
Israel	X	X	X		X			X
Jordan	X	X	X	X	X		X	
Libya		X			X			
Lebanon	X	X	X		X		X	
Morocco	X	X			X	X	X	X
Tunisia	X	X	X		X	X	X	X
Syria	X	X	X	X	X		X	X
Iran								

Source: Kalaycıoğlu (2011).

These trade agreements facilitate exchanges between partner countries by decreasing the waiting time and transaction costs (World Bank, 2012). Turkey signs free trade agreements with the countries with which the European Union conducts negotiations in accordance with the terms of the European treaty on customs union. Free trade agreements are also signed with Macedonia, Croatia, Bosnia and Herzegovina, Albania, Georgia, Serbia and Montenegro, Chile, Mauritania and South Korea[6]. Turkey is negotiating with fourteen other countries including Ukraine, Colombia, Ecuador, Malaysia, Kosovo, Moldavia, the democratic Republic of Congo, Ghana, Cameroon, Seychelles and the Faeroe Islands. Other agreements are being negotiated with the United States, Canada, Japan, India, Indonesia, Vietnam, Peru, Mexico and the Central African Republic. While improving the institutional framework of exchanges, these initiatives provide Turkey with the necessary conditions to increase its competitiveness on international markets and reduce its dependence on European Union markets[7].

Box 1: Turkish agro-food trade

This box gives an overview of agro-food trade performance in Turkey in the last twelve years. It also includes snapshots on the major agro-food trading partners and on the characteristics of Turkish agro-food products.

Historically, Turkey has clearly been an exporter of agro-food products (see Table 3). However, this position of Turkey should be evaluated with caution because of the heavy tariff and non-tariff protectionism of some major agricultural products. For instance, the imports of meat, dairy products, sugar and cereals are rare due to prohibitive protectionism. The average consumer spends more than 30% of his income on food.

The government allows the importation of basic foods in the case of world or domestic price hikes. By granting duty free imports the government has managed to decrease the wedge between domestic and world prices. The general tendency of the agro-food import policy has been to allow the imports of manufactured intermediate inputs intended for exports. Coupled with high performing exports, the high protectionism has oriented agricultural production. This has also been a major factor in supporting agro-food trade exports.

Table 3 - Turkish agro-food trade* (1999-2011)

	1999-2001	2003-2005	2007-2009	2010-2011
Agro-food trade (million dollars)				
Exports	3,996	6,220	10,098	13,130
Imports	2,763	4,501	8,386	11,711
Net exports	1,233	1,718	1,712	1,419
Total export and import percentage				
Agro-food export	14.0	10.1	8.9	10.6
Agro-food import	6.1	4.8	4.9	5.5

* Including all products covered by the WTO-Agreement on Agriculture (medium terms).
Source: Turkstat (2013).

6 - According to information provided by the Turkish Ministry of economy (www.ekonomi.gov.tr/sta/#ftnrefl).
7 - *Ibid.*

The average annual growth rate of agro-food imports (17%) was higher that the corresponding rate of agro-food exports (13%) during the last decade. Both exports and imports gained momentum thanks to the macro-reform program including agriculture. The net agro-food exports have declined in the recent years.

Although the EU remains the top destination for agro-food exports, the share of the Near and Middle East is growing rapidly (see Table 4). The net exports to the EU have remained positive during the last decade. The already low share of North African countries in the agro-food imports from Turkey declined steadily. Agro-food exports to North Africa have stagnated. They amounted to around 3-4% during in the last decade.

Table 4 - The percentage of the trading partners of Turkey in agro-food trade* (1999-2011, in %)

	Exports				Imports			
Regions and Countries	1999-2001	2003-2005	2007-2009	2010-2011	1999-2001	2003-2005	2007-2009	2010-2011
EU-27	47.6	50.5	40.1	34.3	31.2	33.0	27.8	29.2
Near and Middle East**	15.5	16.0	23.0	29.6	5.4	3.4	1.4	1.6
North Africa	4.6	3.2	3.9	4.1	1.9	1.4	1.2	0.7
Rest of the World	32.3	30.4	33.0	32.0	61.6	62.2	69.7	68.6

* Including all products covered by the WTO-Agreement on Agriculture (medium terms).
** The data for Iraq start in 2003.

Source: Turkstat (2013).

The overview of trade by level of processing and the relative proximity of the products to the final consumers is presented in Table 5. Around 77% of Turkish exports are finished goods. The opposite is observed in the imports. The imports of wholesale commodities and intermediate goods constitute around 80% of Turkey's total agro-food imports. A rapid decline in the share of wholesale exports and the stagnant share of wholesale imports may be considered as the manifestation of high protectionism. A steady increase in the imports of finished products reveals the advantage of opening markets, mainly through preferential trade agreements.

The share of finished products in agro-food exports to the EU recently reached 90%. A similar pace is observed in the imports from the EU, but depending on products, the shares are more evenly distributed. The agro-food trade between Turkey and the MENA countries presents a similar development. In general, the different product categories become final products when they are intended for exports. The concentration on a few sub-sectors seems to be remarkable. Fruits, nuts and vegetables make up around 40% of exports. Another 20% of exports consist of processed fruit and vegetable products. An increasing trend in processed cereals can also be observed. In the case of imports, there is a slight change. Intermediate inputs and finished products are preferred to raw materials in bulk. Representing more than half the total imports, various agricultural raw materials, especially leather skins and fibers are dominant in agro-food imports. Despite the generous national subsidies to support the production of oleaginous, its share in total imports remained at around 25%.

Table 5 - Turkish agro-food trade* according to product categories (1999-2011, in %)

	Total Exports				Total Imports			
Product categories**	1999-2001	2003-2005	2007-2009	2010-2011	1999-2001	2003-2005	2007-2009	2010-2011
Commodities	18.2	10.9	7.8	7.2	46.9	44.0	42.6	40.4
Intermediate Products	16.2	14.8	15.0	16.2	36.6	38.7	37.0	38.5
Finished Products	65.7	74.2	77.2	76.5	16.4	17.3	20.4	21.1
	Exports to EU-27				Imports from EU-27			
Commodities	14.9	9.8	8.2	7.9	30.9	23.9	25.6	18.6
Intermediate Products	10.5	9.3	5.8	5.4	42.8	44.5	38.6	42.1
Finished Products	74.6	81.0	86.0	86.7	26.3	31.7	35.8	39.3
	Exports to Near and Middle East				Imports from Near and Middle East			
Commodities	5.4	4.9	3.3	4.2	56.6	54.7	29.1	34.3
Intermediate Products	37.4	28.5	29.9	30.2	31.8	33.7	41.9	38.5
Finished Products	57.3	66.6	66.8	65.6	11.5	11.5	29.0	27.2
	Exports to North Africa				Imports from North Africa			
Commodities	41.2	6.3	3.5	9.7	86.2	74.2	71.3	52.1
Intermediate Products	12.7	33.8	26.2	19.1	7.3	19.8	15.3	27.3
Finished Products	46.1	59.9	70.3	71.2	6.5	6.1	13.4	20.6
	Exports to ROW				Imports from ROW			
Commodities	25.8	16.5	11.0	9.0	53.0	53.4	49.2	49.7
Intermediate Products	14.8	14.9	14.6	14.6	34.8	36.4	36.6	37.0
Finished Products	59.3	68.5	74.5	76.4	12.2	10.2	14.2	13.3

* Including all products covered by the WTO-Agreement on Agriculture (medium terms).
** Definitions of categories are from EC (2010).

Source: Turkstat (2013); EC (2010).

Given the relatively small space left to exporters, the dynamic nature of food trade should be acknowledged. Basically, Turkey allows the imports of commodities to feed its growing population and to meet the exporters' intermediate inputs. The performance of the trade sector depends entirely on the ability of exporters of fruit and vegetable products in exploiting international market opportunities. It may be noted with irony that the level of government involvement in this type of product

is almost nil. The opposite is observed in the basic food commodities. Almost all policies target basic crop products and Turkey is becoming a perpetual net importer in this product group.

Turkish agro-food trade is based on crop products. Trade in livestock products remains negligible. Hence, Turkey is far from considering the full development of agro-food trade. Supported by the increasing productivity of policy measures promoting agricultural trade liberalization, the operating margin of fruit and vegetable exporters will be expanded. Finally, the ability of the agro-food sector to compete with imports and international markets would increase its potential.

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Sources: European Commission (EC) (2010), Definitions of Agricultural Commodities, Iintermediate and Final Products as Defined in the Combined Nomenclature *(http://ec.europa.eu/agriculture/agrista/tradestats/annexes/annex4.htm); TurkStat (2013),* Foreign Trade Statistics [Data files], *Ankara, Turkstat (http://tuik.gov.tr).*

Transport and logistics in the development of the Turkish agro-food sector and its expansion at international level

Supported by the improvement of its international institutional framework, the ongoing growth of Turkish international exchanges is transforming haulage companies into real logistics service providing companies. Besides the will to avoid geopolitical conflicts that continue in the region, the need to gain time and decrease transport costs lead these companies to gradually opt for intermodal and roll-on, roll-off transport. After a first line established in 1985 between Istanbul (Haydarpasa) and Romania (Köstence), several others have been established to transport goods to Italy, Russia, France, Ukraine or even Romania. The private company U. N. RO-RO İşletmeleri A. Ş. founded in 1994, taken over by the financial firm KKR in 2007, then sold again to DSV, the Danish giant of the logistics sector, remains so far the most active company in terms of Ro-Ro transport between Turkey and European countries (Ersoy and Tozanli, 2012).

However, one should not undermine the role of internal dynamics in this development. The extension of the setting-up of big agro-tertiary and retail companies since the 1990s have given a spectacular boost to the development of logistics in the Turkish internal market. By introducing their own standards and requirements in terms of supply, transport and storage on the domestic market, these companies have enabled an impressive technological and organisational upgrade. Thus, the years 2000 mark a period of an even stronger expansion of the Turkish logistic sector.

With an annual growth rate of 20% since 2005, this sector occupies the second position behind tourism in the list of the most dynamic sectors of the country. Above all, it places Turkey in 26th position of the world rankings and in 2nd position of the SEMCs, according to the performance index of the logistics sector (average for the years 2008-2012) established by the World Bank, while the country was in 39th position in the world rankings based on the average for the years 2007-2011[8]. The

8 - http://donnees.banquemondiale.org/indicateur/LP.LPI.OVRL.XQ/countries?display=default

sector is no more only defined by the only function of transport but also includes 3PL service companies (a third logistic part), i.e. it is in charge of an important part of the logistics for its customers. The arrival of foreign capital in this sector is a driving development factor through the technological transfer that foreign companies introduce into the national sector. Today, the share of foreign firms in the total logistics market shares is estimated at 30% in the overall market. (Karadogan, 2011).

With a 78 billion euro total value in 2012 (against 41 billion euros in 2008), the share of transport and logistics[9] sector in the GDP at this date was estimated at 14% (Turkstat, 2013; IGEME, 2009). A recent survey realized by Quattro Business Consulting with 502 logistic firms, reveals that the sector accounts a total value of activities of about 120 billion euros. However, the economic vitality of the sector remains very uneven. This situation is directly related to the distrust of industrial firms, customers of the logistic sector operators vis-à-vis 3PL firms. The big industrial companies generally pursue an internalization policy of logistic activities and for strategic reasons, do not share, refrigerated trucks or warehouses with their competitors. For this reason, the share of 3PL firms in the national GDP remains below the threshold of 10%, and their growth rate between 2005 and 2010 hardly reaches 7% (against an average of 20% for the whole sector). However the big agro-industrial firms opt for a different strategy. A typology can therefore be established according to the behaviour and the investments of firms in the logistic sector (Ersoy and Tozanli, on 2012).

These international firms are almost exclusively orientated towards international trade activities. It is important to remind that 54% of exports and 24% of imports are made by international transport companies, 1,340 in 2009 (Gülen, on 2010). Besides, there are 2,000 customs agencies, 250 3PL companies and 200 customs warehouses (Deloitte, 2010). However the structure of the sector remains very heterogeneous and dispersed (Babacan, 2003). In Turkey, three types of actors can be distinguished:

- A very large number of micro-companies exclusively operating on domestic road transport, looking for short-term profits and that have a conventional vision without a forward-looking strategy. They constitute two thirds of the active firms in the sector.

- A rather important number of small and medium-sized enterprises (SME), mostly family owned and originally orientated towards road transport before evolving towards bigger logistics companies. Very often managed according to the personality of the founding entrepreneur, they tend to develop a dynamic commercial vision.

- Some very large companies with strategies centred on the average and long terms with modern management and aiming at competitiveness at a regional or even global level. Most of them are 3PL. They include foreign companies settled in Turkey, which establish partnerships with their Turkish counterparts or create their own subsidiary in the country. As global actors, these logistic companies significantly invest abroad and organize their activities at global scale. Some of them are more particularly specialized in the logistics of food products (Baynak Lojistik, Netlog Lojistik/Polar Lojistik/Polar XP, CEVA and Omsan) (see Table 6).

9 - Communication transport and storage sectors according to the official title of the Turkish statistical Institute (www.tuik.gov.tr).

Table 6 - Rankings of the major Turkish logistics companies according to their turnover in 2011

Company	Group	Turnover 2012 (2) (in million euros)	Turnover 2011 (in million euros)	Turnover 2010 (3) (in million euros)	Turnover 2009 (in million euros)	Variation 2011-2009	Foreign Location (4)
UN Ro-Ro İşletmeleri A. Ş.	DSV (Denmark)		200 (e)				–
UPS Türkiye (e.g. Unsped Paket Servisi)	UPS (United States)		n. c.	n. c.	146.1		
Ceva Lojistik	CEVA Logistics (United States)		269.4	226.3	113.1	100.1%	
Netlog Lojistik Servisi	Family Çak	312.1	275.3	188.7	135.1	38.7%	Afghanistan, Romania
Horoz Lojistik	Horoz Şirketler Grubu	146.1	240.3	176.6	83.0	112.7%	Germany, Italy, Russia, Poland
Borusan Lojistik Dağıtım	Borusan Holding	461.3	205.5	162.5	123.4	31.70%	Netherlands, EAE, Algeria, Kazakhstan
Omsan Lojistik	OYAK (1)	246.4	217.5	139.8	214.8	12.0%	Germany, France, Bulgaria, Romania, Russia, Azerbaijan
Fasdat Gıda Dağıtım	Ata Holding		182.2	198.1	90.3	53.0%	
Ekol Lojistik	Invest AD (EAU)	284.4	221.1	128.6	123.3	4.3%	Germany, Italy, Romania
Balnak Lojistik Grubu	The Great Circle Fund (United States)		142.5	115.8	103.1	12.2%	Libya, Egypt
Mersin Uluslararası Liman İşletmeciliği	Akfen Holding, PSA International (Singapore)		142.5	112.4	94.1	19.4%	
Reysaş Lojistik	Reysaş Grubu	127.3	102.4	91.7	90.3	1.5%	Malta
Mars Lojistik	Mars Lojistik Grubu		130.2	81.9	86.3	– 5.2%	France, Tunisia, Germany, Belgium
Gökbora	Gökbora			72 (e)			Germany, Italy, Romania, France, Azerbaijan, Bulgaria

(1) Turkish army pension funds.
(2) Fortune 500 Turkey 2010 (www.fortuneturkey.com/fortune500-2010).
(3) Company Sites.
(4) Company websites.
(e) Estimates
Note: For exchange rates see http://fxtop.com/fr/historique-taux-change

Source: Capital 500 (www.capital.com.tr/siralamalar/html/2010.ht).

According to state statistics, today, including several jobs and activities, the transport and logistics sectors employ 1.1 million people (Turkstat, 2013). Road transport dominates the sector, both in number of companies and in terms of shares: in 2009, 42% of Turkish imports were made by road transport (46% by maritime transport), a share that reached 59% of the country's exports (Deloitte, 2010). The predominance of road transport is even clearer at national level, because it approximately ensures 90% of the routing of goods.

Box 2: The fruit and fresh vegetables chain and the impact of large-scale distribution on its reorganisation

The quinquennial averages (2006-2010) for fruits and fresh vegetables (FLF) in Turkey show that only 10% of the production is exported (approximately 4 million tonnes for 40 million produced tonnes) (Turkstat, 2013). If we consider that approximately 30% of the production is later damaged and lost after harvest and if 15% of this total production is transferred to the food-processing[10] industry, 22 million tonnes of fruits and vegetables would thus be marketed on the domestic market. According to Ibrahim Yet Kin, president of the Farmers' Association of Turkey, "the major part of fruits and vegetables is marketed off the formal circuits, since only 9 in 10 million tonnes of fruits and fresh vegetables transit through wholesalers[11]". In the formal circuits, the position of the modern large-scale distribution is increasingly growing. The market shares of all fruit and vegetable purchases approximately represent 25% of consumers' expenses. The survey made by Sonar[12] in 2004, on a sample of 1,177 people in ten big Turkish cities, shows that 28.4% of the interviewees declared buying fruits and vegetables from district markets, 22.2% from hypermarkets and supermarkets, 14.8% from fruits and vegetable shops and 9% from other types of outlets.

Another survey conducted in the city of Antalya in 2009 among 669 households reveals that 43% of fruits and vegetable purchases are made from district markets, 27% from hypermarkets and supermarkets, 18% from specialised greengrocers and 12% from other types of outlets[13]. By organising the management of its supply chain, large-scale distribution has undoubtedly a growing impact on the coordination of the various functions of logistics and in the reorganisation of the local fruit and vegetable channels. The supply strategies of the largest companies in the retail trade vary from a brand to another. For the first time in the country, in 2009, Migros Turk, signed an agreement with the ministry of Agriculture, Rural and Food affairs stipulating that the company buys fruits and vegetables directly from the more than 3,000 small producers that have agreed to apply the good agricultural practices defined and certified by the Ministry. Despite this encouraging initiative, the management of supply chains in the major brands tends to orientate the channel towards a concentration. It is indeed very difficult for small producers to group within cooperatives and at the same time to be able to meet the requirements determined by

10 - Akbay (C.), Candem (S.) and Orhan (E.) (2005), "Türkiye of Yas Meyve ve Sebze Ürünleri Üretim ve Pazarlamas", *KSU. Newspaper of Science and Engineering*, 8 (2), pp. 96-107.

11 - Anonymous (2009), "Sebze-meyve tüketiminin yüzde 80'i i kayit disi tuketiliyor", *Retail Turkey*, 2 April, pp. 6-16. However, the new act N 5957 of 2012 requires the registration of all fruit and vegetable sellers and buyers (farmers, retailers, agents, exporters, restaurants, hotels, etc.) on the wholesale markets website, thus enabling the regulation of the fruit and vegetable trade according to the principles of traceability.

12 - Anonymous, *2003 Tuketici AliskanliklariArastirmasi* (www.ampd.org/arastirmalar/default.aspx?SectionId=10).

13 - Akpinar (G.) (2012), "Analysing the Effects of Consumers' Demographic Characteristics on Preference for Fresh Fruit and Vegetables Supply Chains", *African Journal of Agricultural Research*, 7 (9), pp. 1442-1449.

the trade and sanitary quality standards of large-scale distribution. The fact that according to the new Turkish legislation, the purchase departments of the major brands are the first to be accused in case of consumers'[14] complaints, is leading hypermarket and supermarket chains to be very cautious in choosing their food and vegetable suppliers and to favour cooperation with big companies/qualified exporters according to private international standards such as Global GAP, BRC, Tesco standards or Doga Tat Carrefour. Most of the major brands have about twenty suppliers (wholesalers or agents) certified under contract. For example, Tesco-Kipa buys its fruits and vegetables from 35 regularly audited suppliers. Another major brand concerned by the compliance to the standards of sanitary quality, Metro Cash & Carry, was certified by IFS for its stores located in Antalya in April 2010. According to this logistic standard, a chain of traceability is established "from the field up to the plates" to guarantee consumers with the good commercial and sanitary quality of fresh products. The company has built big logistic warehouses in Istanbul-Gebze to receive and store large volumes of fruits and vegetables.

These changes involve important restructurings and prepare the ground for the arrival of new actors such as Mango Gida, a company founded in 2000 by two young entrepreneurs, former carriers at Istanbul's wholesale market. With a strong exponential development, Mango Gida annually handles 100,000 tonnes of fruits and vegetables and supplies major brands such as Migros, Carrefour SA, Real or BIM. Today, the company owns warehouses in Istanbul, Ankara, Bursa, Antalya and Adana and develops upstream activities of the channel by renting fields and orchards in various places in Turkey and by choosing strategies of contracting with a large number of small developers[15].

The arrival in Turkey, in September 2011, of the IFCO Systems N. V. is another trend to analyse. The Dutch giant which is present in 45 countries, supplies or rents from the major retail trade brands specialised in packaging for the transport and storage of fruits and vegetables. Today, the number of crates used (and rejected after use) by the major brands is estimated to over 2 million. The managers of the IFCO Turkish subsidiary aim at reaching 35 million rented crates in 2015. Besides, the establishment of an intelligent recycling method via the rental of crates, the company aims at improving hygienic conditions in the transport and storage of fruits and vegetables[16]. The refrigerated trucks that were only used for the export fruits and vegetables are now regularly used to supply hypermarkets and supermarkets with fresh products. The development of the sector also leads to predict the extension of labelling, packaging and modern logistics to the traditional retail trade. The fact that the in district market sellers in Ankara have begun to accept credit card payments can be considered as a step in this direction[17]. It is an example of an environmentally responsible economic development.

14 - In 2009, Hunkar Unlu, the person in charge of purchases at Carrefour Karsiyaka/Izmir was sued in court because of the high degree of pesticide residues detected in a batch of pears and the absence of traceability of the farmer/supplier. Interview with Hunkar Unlu at Carrefour Limited Company Karsiyaka/Izmir, 7 October 2010.

15 - Article in *Hürriyet* newspaper, 11 October 2011 (http://hurarsiv.hurriyet.com.tr/goster/printnews.aspx?DocID=18949852).

16 - Interview with Onur Aytekin, general director of IFCO Lojistik, *Gida Yasam*, 26 September 2012 (www.gidayasam.com/soylesiler/6621-taze-gida-lojistiginde-ifco-devrimi).

17 - *Hürriyet Ekonomi*, 5 February 2011 (www.hurriyet.com.tr/ekonomi/16936160.asp).

Table 7 - The evolution of retail trade total sales according to different types of outlets

	2006	2010	2011	CAGR 2006-2011
Modern corner shops	28.7%	42.4%	46.2%	6.4%
Hypermarkets	3.1%	4.7%	5.6%	7.5%
Supermarkets	19.2%	25.9%	27.4%	5.2%
Discounters	4.9%	10.5%	12.0%	10.2%
Petrol station shops	1.4%	1.3%	1.2%	1.0%
Traditional corner shops	71.3%	57.6%	53.8%	– 0.4%
Independent corner shops	52.6%	42.7%	39.8%	– 0.4%
Specialized shops, buffets	18.3%	14.5%	13.6%	– 0.6%
Other types of retail	0.5%	0.5%	0.4%	0.9%
Total of food retailing (in million Turkish pounds)	98,866	117,767	124,648	2.0%

Source: Adaptations of the author based on Euromonitor International data, April 2012.

The development of international trade and its impact on transport and logistics infrastructure in Turkey

The objectives set by the government to make Turkey a hub for logistics, and thus an economic hub, will necessarily be reached through the outcome of large-scale infrastructure projects (transport and logistics) and by the modernisation of already existing transport networks (road, railroad and maritime).

Turkey is part of the European transport networks program with corridors IV and X extended to Istanbul (Centre d'analyse stratégique, 2011). Supported by European pre-accession funds, Turkey significantly invests in the construction of railroads, the electrification of the existing network and especially the connection of railroads to harbour logistic zones. Turkey is also actively involved in the TRACECA program, in the Europe-Caucasia-Asia transport corridor and is developing the railroad network connecting the East Anatolia (Kars) to Azerbaijan and Georgia. Partly financed by the European Investment Bank (EIB), another big infrastructural strategic program is the construction of the "Marmaray" tunnel and railroads, one intended for public transport and the other for the main trade transport lines under the Sea of Marmara which will connect the two shores in Istanbul in 2013 (Ersoy and Tozanli, 2012).

In the last ten years, investments were focused on the extension of the country's seaports capacity in order to meet greater traffic in connection with multimodal transport of goods. According to the 2011 Eurostat data, with about 360 million tonnes of goods (incoming and outgoing) handled in its ports, Turkey was classified 5th in this domain, behind the United Kingdom, Italy, the Netherlands and Spain. In 2011, Turkey was in the 22nd position of the World Bank rankings of container traffic in ports, with a total of 6 million TEU (Twenty Foot Equivalent Unit) handled[18]. Despite the progress realised since the beginning of the 2000s, the total capacity of the country's seaports is still insufficient and important investments in infrastructures are necessary (see Table 8).

Table 8 - Characteristics of major Turkish seaports

Name	Geographical Location	Managing company	Number of quays	Annual capacity (in tonnes or in TEU)
Mersin	Mediterranean Sea	MIP	21	2.5 million TEU/ 5 million tonnes
Ambarlı/ Istanbul	Sea of Marmara	Altaş A. Ş.	13	2.7 million TEU
żmir	Aegean coasts	TCDD*	24	895,000 TEU/ 12 million tonnes
Aliaga	Aegean coast	TCDD*	12	70 million tonnes
Haydarpaşa/ Istanbul	Sea of Marmara	TCDD*	2	144,000 TEU
Bandırma	Sea of Marmara	Çelebi A. Ş.	20	150,000 TEU/ 2.8 million tonnes
İskenderun	Mediterranean	Limak A. Ş.	6	2.4 million tonnes
Samsun	Black Sea	Ceynak A. Ş.	n. c.	2.4 million tonnes
Derince	Sea of Marmara	TCDD*	7	30,000 TEU/ 6.9 million tonnes
Derince	Sea of Marmara	TCDD*	7	30,000 TEU/ 6.9 million tonnes
Trabzon	Black Sea	Alport/ GroupAlbayrak	6	37,000 TEU/ 5 million tonnes
Çesme Ro-Ro Port	Aegean Sea	Ulusoy Holding	2	
Çandarlı	Aegean Sea	*Under construction*		2.2 million TEU (estimate)/ 20 million tonnes

* National Turkish Railway.

Source: Adaptations of the author based on information gathered from the port managing companies on the Internet.

18 - http://data.worldbank.org/indicators/IS.HP.GOOD.TU

The need to invest in port infrastructure led the government to innovate management and to adopt the "build-operate-transfer" system. Thus, the management of several ports (Bandirma, Samsun, Mersin and Iskenderun) until then run by public institutions was divested to private logistics companies for a period going from twenty-five to thirty-six years. In return, these private companies plan significant investments in infrastructure aiming to increase storage and handling capacity (Ersoy and Tozanli, 2012). Other ports (Izmir, Derince) could experience the same privatisation in the near future. The completion of the construction of the port of Çandarli, near Izmir, considered as one of the ten biggest seaports in western Europe, provide an annual capacity of 2.2 million additional TEUs as soon as it is functional. The call for tenders for the management of this port has already been launched but the name of the managing company is not yet known.

The initiatives of establishing "logistic centres" (Ankara, Samsun, Mersin, Kars, and Iskenderun) to better manage intermodal and combined logistics is another important development project. Under the control of local authorities (municipalities, Chambers of Commerce and Industry), these investments are also financed by subsidies granted by the European Union within the framework of the pre-accession program, by local and national funds and private capital. The private sector indeed began to invest significantly in maritime transport and in harbour management through the privatization of ports that were previously managed by the Turkish State Railways (TCDD) and the maritime state companies (Denizcilik Isetmeleri) until 2005. These changes have led the biggest logistic firms of the country to opt for intermodal solutions by investing in harbour and railroad facilities.

Conclusion

The development of Turkey is increasingly based on the tertiary sector. The dynamism of the country in terms of international trade is supported by the increasing number of bilateral and multilateral free trade agreements signed since the beginning of the 2000s, but also by the investments in infrastructure to expand the road, rail and maritime networks linking Turkey to Europe, Asia and Africa, based on its unique position at the crossroads of three continents. The internal dynamics driven by private companies in the agro-industry, transport and logistics support government projects, demonstrating a well organised, efficient and promising public private partnership. It is also interesting to note that Turkey is increasingly moving towards South-South exchanges and expanding its areas of cooperation with other south-eastern Mediterranean, central and eastern European and Asian countries.

These advances will perhaps encourage western Europe to strengthen its ties with Turkey. If not a partner, Turkey may well become a formidable competitor.

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CHAPTER 18

INFRASTRUCTURE AND AGRO-FOOD LOGISTICS IN ALBANIA

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Albania is a Mediterranean country covered with pastures, forests and green areas that stretch out to the blue waters of the Adriatic and Ionian Seas. Two thirds of the country's surface area is mountainous (28,748 km^2) so the land used for agriculture is quite hilly. Nevertheless, there are a lot of crops including olives, vines, citrus, plums, tomatoes, onions and vegetables. With regards to livestock farming, lamb breeding largely prevails. The Mediterranean diet, the wonderful beaches and the fresh fish as well as the ancient and rich culture and history are typical of the shared Mediterranean values and treasures.

Aspiring to become a full member of the European Union since 2007, Albania has negotiated numerous economic and political agreements with the EU institutions since the beginning of the democratic era. Today, the accession process urges the Albanian authorities to implement further economic reforms so as to comply with the common market compatibility criteria in the coming years. An ambitious economic reform program was launched in 1992 to lead the country towards a market economy. This program included price and exchange rate system liberalisation, fiscal and monetary control and a comprehensive package of structural reforms including privatisation, the reform of the enterprise and financial sector as well as setting up and enforcing the legal system and market principles.

As for agricultural and agro-food products, the Albanian trade regime has also been implemented in full compliance with (i) the Stabilization and Association Agreement between Albania and the European Union, (ii) Albania's commitments to the World Trade Organization (WTO) and (iii) the Central European Free Trade Agreement CEFTA. Albania became a member of the WTO in 2000. Reforms in legislation and policies were then implemented to comply with the WTO regime. As a result, Albania

has already developed and implemented a very liberal regime with regards to the trade of food and agricultural products.

In fact, these political and economic changes that started in the 1990s have had an impact on the development of infrastructure and logistics. Firstly, this paper will give an overview of the logistics sector and its role in Albania's economic development. Secondly, the impact of the recent reforms will be addressed.

Population and economic transition: the need for infrastructure

According to a recent OECD classification, today, Albania is a high middle-income country. With 16.9% of GDP (INSTAT-2009) and 43% of the working population living in rural areas, agriculture is still one of the most important economic sectors. During the 2000-2008 period, Albania was among the fastest growing economies in Europe with an annual real GDP growth rate of about 6%. The Albanian macroeconomic situation is characterised by price stability, which is reflected in a low inflation rate (2-4%) and a relatively stable exchange rate of the domestic currency.

According to the Population Census of 2011, on the 1 October of the same year, Albania had a resident population of 2,821,977. Since 1990, there was a mass emigration in the country. As a consequence, the population started to decline. For the first time, amounting to 53.5%, the urban population has exceeded the rural population, which represented 46.5%. This shift of population from rural to urban areas is fuelled by economic development and thus stimulates income growth.

This economic boom and also the progressive distance between the production and the consumption areas have also had an impact on the development of infrastructure. Over the last decade, investments have been made to boost the development of infrastructure. This has played an increasingly important role in fostering economic development and intensifying the economic ties between various areas in the country.

The rural road network

Rural roads infrastructure has been improved in the past years thanks to the construction of 1,600 km of communal and secondary roads, as well as the establishment of a more appropriate system for the management and maintenance of secondary roads. Nevertheless, the need for more investment remains crucial. Rural road infrastructure will be expanded with 3,500 km of new or improved roads. Furthermore, the objective is to extend the maintenance of 1,700 km of the rural roads network from 2013 to 2020 according to the Albanian Development Fund. The development of rural roads has a high impact on the access of agriculture products to the market.

The national road network

Albania has a road network of about 18,000 km including 3,636 km of national roads, 10,500 km of interurban roads and the remaining 4,000 km are under the jurisdiction of autonomous units, enterprises or companies. For the Albanian government, investment in the road network was a strategic priority in the development

of the country's economy in order to improve the access of agricultural products to domestic markets, the supply of the agro-processing industry and the export to other countries in the region and beyond.

The construction of the Durrës-Kukë/Morinë-Prishtina road is one of the Albanian government's biggest investments. It will have a great impact on trade relations between the countries bordering the Adriatic and Mediterranean seas through the Ports of Durrës and Shengjin. It will also help increase trading activities within the region especially with Kosovo, Montenegro, Serbia, Macedonia and other Balkan countries such as Romania, Bulgaria, etc.

Thanks to its geographical position, Albania is connected to European networks that facilitate regional and international transport corridors. This contributes to the promotion of agricultural trade at the European and international level.

Maritime transport

Today, ports are no longer considered as isolated functional nodes of the transportation chain, but rather as the fundamental components of a seamless supply chain, working along with satellite and inland terminals (Gattuso, 2007). Situated in the southeastern part of the Balkans, Albania enjoys a very favourable geographic position. It has a coastline of about 440 km, i.e. a third of its borders are along the sea.

Durrës, Vlorë, Sarandë, and Shëngjin are Albania's main seaports. Regular ferry, freight, and passenger services from Durrës to Trieste in Italy have been established since 1983. In 1988, a ferry service was also established between Sarandë and the Greek island of Corfu. Moreover, a regular lake ferry service links the Macedonian town of Ohrid with Pogradec. The estimated total volume of Albania's merchant fleet amounted to 56,000 tonnes in 1986. Since 2011, the Port of Durrës has also undergone major renovations.

In the 1970s and 1980s, due to the economic development in general and in the mine industry in particular, there were substantial developments in the maritime merchant fleet. The government has acquired ocean-going vessels for the transport of goods for import-export. These vessels have a capacity ranging from 12,500 dead-weight tonnes (DWT) to 16,000 DWT and the fleet reached a total capacity of about 90,000 DWT. In the 1990s, the commercial fleet was privatized. Today, several private owners have ships with a capacity of about 1,000-2,000 DWT. The fleet also includes 9 vessels with a capacity of 11,000 DWT each, i.e. with a total capacity of 99,000 DWT. Nevertheless, this important sector remains weak, both in terms of management and technology.

As a sub sector of maritime transport, waterway transport via rivers and lakes has been used for the transportation of goods through the ports of Durrës, Vlora, Shengjin and Sarandë. Transport across the lakes of Vau i Dejes, Koman and Fierza still existed in the 1990s, with a capacity of 150,000 tonnes of goods and around 200,000 passengers.

Railway transport

The Albanian railroad network has a total length of 421 km main line and 230 km secondary line. This railroad network is connected with the international railroad network through the Bajza-Podgorice, Monte Negro line, where freight international transport is carried out. The condition of railroad infrastructure presents low technical indicators; hence the running speed of trains in line is limited. However, the average life cycle of railroad vehicles is high. The approval of the new legislation in line with the EU *acquis* creates the terrain conducive to the restructuring and improvements of railway transport.

Recent developments in the agro-food and logistics sector

Agriculture is one of the most important sectors contributing to the Albanian GDP. The agricultural sector including both production and processing represents 16.9% of the GDP. Due to various investments and government support, agricultural production has increased steadily during the last decade and is both intended for local consumption and trading. The recent aim is now to also reach the national, regional and international markets.

Agriculture and food trade

The impact of the production increase is reflected in the volume of trade in the agriculture and food sector, which increased by 3.8% in 2012 compared to the 2011. In addition, the increase in domestic production has led to the decrease of the volume of imported products and the import to export ratio. The EU remains the largest food exporter with a 20.8% share in world exports (CEC, 2009). In Albania, 52.9% of imported food products come from the EU, 13.6% from CEFTA countries and 33.4% from other countries of the world, according to the Ministry of Agriculture, Food and Consumer Protection (MAFCP).

The export of Albanian agriculture and food products to EU countries has steadily increased year by year. Around 67.9% of total exports of agricultural products (in value) go to EU markets and EU countries such as Italy, Greece, Austria, Germany, France, Bulgaria, Poland, Romania, Hungary, Latvia, etc. In addition, 20.9% of exports go to CEFTA countries such as Croatia, the Former Yugoslav Republic of Macedonia, Montenegro, the Republic of Moldova and Serbia and 11.2% go to the rest of the world.

Exports are mainly dominated by fresh agriculture products such as fruits and vegetables as a consequence of the increase of the domestic production, while the export percentage of processed agricultural products to the EU markets remains very low. The agro-processing sector remains a small and developing sector, focused on fulfilling the domestic demand. Notwithstanding, during 2012, the total export value of processed products to EU countries has increased by 79.9% compared to 2011. The imports of processed products coming from the EU countries for the period between 1 January and 30 November 2012 increased by 6.2% compared to the same period in 2011 (MAFCP).

The structure of the agro-food and logistics sector

In Albania, the agro-food sector is dominated by small and medium enterprises just like the European food sector with 99% of small and medium enterprises (CEC, 2009). The agro-food industry has expanded gradually and steadily thus leading to an annual average increase in value of about 6% for the year 2012 (MAFCP). The productivity of the agro-processing sector has increased by 7.5%, i.e. from 4.7 million Albanian Lek (ALL) in production value per employee in 2007 to 5 million ALL per employee in 2011. This was consequently accompanied by an increase in employment from 10,300 to 11,300 over the same period. Nevertheless, despite the good performance in output growth of agricultural raw materials, the agro-food sector still represents a small proportion of the total agricultural production. The value of the agro industry's contribution to the total agriculture production is of 24.3%.

The structure of the agro-processing industry is mainly composed of the production of bakeries, mineral and sparkling water, beer, olive oil, dairy products, meat, wine and processed fruit and vegetables. During the last two years, investments in the agro-processing industry have mainly increased in the sectors of fruits and vegetables, milk and dairy products, flour made from cereal grain and wine production, etc. Year by year, there has been an increase of investments in technologies rather than in the construction of building facilities thus revealing the necessity to invest in both the quantity and quality of products. In the agro-food sector, the biggest companies according to the structure are mainly those that produce meat and meat production, fish and fish production as well poultry and eggs. Many companies have substantially invested in olive oil production, especially after 2007.

The milk processing industry has recently developed, and new modern factories were established especially in plain areas. However, part of the industry remains fragmented. The availability of state incentives/subsidies and the strengthening of consolidators/collectors, a category of traders involved both in input trading (sold to farmers) and in wholesale trading of products (purchased from farmers), is slowly contributing to improve the situation. At present, consolidators/collectors are the most active value chain actors.

The fruits and vegetable processing industry is composed of 26 formal enterprises and several informal semi-industrial workshops that provide a wide range of processed fruits and vegetables. The production of olives has increased significantly in the last years. The growth of production has been driven by government subsidies. Currently, there are 164 oil producers, most of which own modern olive oil processing lines. Since 2007, there has been a remarkable expansion of plantations stimulated by national support schemes and the number of olive plantations has increased by about 60%. Olive production is concentrated in the regions of Berat, Vlora, Fier and Elbasan, which all together make up for 83.6% of the total production in Albania. In all these regions, there is a mixed production of table olives and olives intended for olive oil – the region of Berat is specialised in the production of table olives.

The production of grapes (both intended for wine processing and table grapes) has increased significantly by almost 1/3 since 2007. The production of wine has almost

doubled. However, due to the increase in consumption, imports have also almost doubled. Grape production is concentrated in the regions of Fier, Berat Vlore and Elbasan, which all together make up for about 60% of the total production in Albania. The majority of wineries are quite small. Considering the size of the value chain, the segment of quality wines is still rather under-developed. Local quality wineries are not yet competitive as compared to the main regional producers and to the main EU producers in terms of price/quality ratio. Therefore, the import of quality wine is high and has been developing over the past decade, as the demand for high quality wine is growing with the increase of living standards and change of life style.

Albania is an active regional actor in terms of the production and trade of fish, seafood and fish products. Moreover, the production has increased over the years. The fishing activity includes marine fish, coastal line fishing in lagoons and inline waters, aquaculture and mussels production.

Albania is well known for the production and exports of medicinal plants that have increased substantially over the past decade. The International Trade Centre ranks Albania as a leading country in the trade of these products on the world market. Albania produces over 60 varieties of herbs and spices, including cooking spices, medicinal herbs and essential oils. This innovative and growing industry has become a major supplier to global food companies. There are about 10 companies that export their products mainly to the U.S., the EU and Turkey. Spices and herbs normally have the same trade structure and distribution channels and very few companies trade herbs exclusively. The Albanian leading companies in the herbs sector are: Albducros, Filipi (exporting sage to the U.S.), Xherdo (producing essential oils).

Packaging products are mostly imported. Albanian imports of paper and packaging products reach up to 20% of the total sales of the food processing industry. Currently, metallic packaging products are all imported while several local companies also produce paper/carton packages.

Food quality

Albanian legislation in the field of agriculture, food and consumer protection has developed significantly over the period 2007-2013 following the signing of the Stabilisation and Association Agreement with the European Communities with the objective of approximation to the EU *acquis* in the related fields.

In addition, the approximation of national legislation and the improvement of food standards and increased investments in the related infrastructure have been observed over the last decade thanks to both the state budget and EU grants. Albania has progressively advanced in transposing more than two hundred EU acts into its national legislation in order to ensure food safety for consumers. Moreover, relevant institutions to implement EU regulations and guaranty the use and application of standards in the basic and processed agricultural products were set up.

The National Food Authority (NFA) is an institution responsible for the control and enforcement of the legislation concerning food safety and consumer protection according to EU standards. It is one of the competent authorities in charge of food

safety in Albania and operates at central and regional level through 12 NFA Regional Directorates. In addition, 13 Border Inspection Points have been established.

Apart from NFAs, there are two National Reference laboratories: the Food Safety and Veterinary Institute (FSVI) and the Plant Protection Department at Durrës as well as 11 food safety laboratories, 11 animal health laboratories and 7 plant health laboratories that are working at local level under the authority of the NFA. The FSVI implements the quality management system based on the ISO 17025:2005 standard and 6 tests have been accredited by the General Accreditation Directorate and by an international accreditation body.

Smart agro-food logistics: dealing with new challenges

One of the main logistic challenges for the agro-food industry is how to deal with high dynamics and uncertainty in domestic supply and demand. There is great uncertainty regarding fresh product quality as well as available volumes in time at a specific place. The sector is characterised by last-minute changes and rush orders. Consequently, the required system of prediction, planning and logistics needs to be very flexible in order to enable last minutes changes and reallocations, but it also needs to provide a robust planning (Verdouw *et al.*, 2013).

According to the above-mentioned study, the current Internet limitations are important bottlenecks to meet the specific challenges of agro-food logistics. The intended development of Future Internet (FI) technologies is expected to overcome these limits. The FI is a general term that labels the emergence of a new era in the evolution of the Internet. It combines several Internet development trends into an integrated approach. Such findings are useful and applicable to Albania as a country that claims a strong commitment to use digitalized services and IT infrastructure.

In this context, Albania is doing great efforts to support the development of information and communication technologies. The investments include the establishment of an adequate legislative framework and a substantial development of the ICT sector. A considerable growth in the availability of e-services across the most basic government services has been observed over the last years – almost 80% of the basic e-government services at central government level are currently accessible.

Knowing that through networks and services, it is possible to achieve strong economic growth and increased competitiveness, one of the main objectives of the Albanian government is to set up a wireless broadband network which will allow Albania's further modernisation and economic, social, cultural and political integration. In the meantime, The ICT for Development Agenda (ICTD) aims at strengthening the positions of the public sector. Thanks to the establishment of a stable ICT policy, strong political commitment towards investing in the sector and the founding of the National Agency for Information Society (NAIS), Albania managed to launch its e-governance program (USAID, 2011).

Conclusion

Although Albania has inherited an infrastructure that is far from meeting European standards, the situation has changed drastically since the 1990's. Investments in infrastructure including the modernisation of ports and the construction of roads that connect Albania with the region and beyond, the development of rural roads and the focus on agro-food logistics are the priorities of the Government for the coming period of 2014-2020.

As put forward by this paper, the improvement of the infrastructure needs to be pursued in order to speed up the transportation of food products to agro-food companies and the transportation of processed products to storage facilities and eventually to domestic markets and exports abroad. The development of the agro-food processing industry will remain a priority of investment policies with a focus on traditional and local value added products that will eventually meet European Union Standards in terms of quality. Investments in IT technology, the implementation of the government's strategies and the "Digital Albania Program" encouraging the spread of e-commerce will contribute to the development of smart agro-food firms and logistics and thus increase the distribution system and food quality.

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CHAPTER 19

TRANSPORT, LOGISTICS AND AGRO-FOOD DEVELOPMENT IN ALGERIA

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With a surface area of 2.38 million km^2 and a coastline of 1,200 km, Algeria is the vastest country of the Mediterranean even if it does not have the longest maritime border. These two parameters reveal the potentialities but also the challenges which characterize the logistics sector and the agribusiness infrastructures of this country.

Its economy is essentially based on hydrocarbons representing more than 50% of the GDP and 98% of income from exports. The strategic sectors including agriculture and the agro-food industry were ignored in development policies in the past. It is only during these last ten years that the decrease in food dependence is considered as a priority of the government.

However, local agricultural production still remains insufficient to meet the country's needs. In the absence of an efficient agriculture, Algeria strongly depends on agro-food imports, making it the largest importer of agro-food commodities in Africa. In 2012, the food bill reached 8.98 billion dollars i.e. 19% of the total value of imports (46.8 billion dollars[1]). Almost all the international trade of the country uses sea routes. The European Union is the main origin and destination of Algerian foreign trade with France as the major supplier and Italy the major customer.

The analysis of the characteristics of the agro-food industry including all sectors confirms that the main supply and consumption centres are situated in the North of the country, near the coast. In fact, harbour cities are these supply and consumption centres that represent less than 15% of the total surface area of the country and are home to 70% of the population concentrated especially in Algiers and its neighbourhood (ONS, 2008). This explains the country's disequilibrium in terms of distribution and logistics.

1 - *El Moudjahid* (www.elmoudjahid.com/fr/actualites/37902).

The gates to Algeria

The routing of imports from various sources of supply scattered around the world (Europe, North and South America, Asia) requires the mobilisation of considerable logistic means. Yet the multiple inadequacies in infrastructures and means of transportation in Algeria make it one of the least attractive destinations of the Mediterranean.

Suffering ports

Algerian ports are located in the North of the country, the only opening to the sea. There were only four commercial ports during the1990s, and eleven in 2006, with the port of Algiers as main maritime platform concentrating a third of the country's international trade.

The politics of modernisation of harbour facilities is still criticised today. Built according to old standards, these ports were designed for small-sized ships because of their shallow depth. Moreover, the depth is reduced by the mudding phenomena that requires regular dredging operations. This obliges ship-owners who use Algerian ports to use small-sized cargo boats. Considered as non-economic, the latter engender important losses in income for the Algerian chargers who have to pay higher freight rates (Tadjine and Ahmed-Zaïd, 2012).

The connectivity index of regular sea transports of 2012, places Algeria far behind its Moroccan, Egyptian or Turkish neighbours (UNCTAD, 2012). The rankings developed by the World Bank for 2012 confirm these poor performances by attributing Algeria the 125th position out of 155 countries, far behind Tunisia, Morocco and Egypt which respectively occupy the 41st, 50th and 57th position (World Bank, 2012). Faced with these continuing multiple difficulties (obsolete infrastructure, slow and excessive bureaucracy and customs etc.), Algeria is the most expensive destination of the region. According to the Doing Business 2011 report of the World Bank, the average cost of an import container is of 858 dollars in Tunisia, 950 dollars in Morocco, and reaches up to 1,318 dollars in Algeria.

The constraints persist despite the efforts of the state that for example, has given the management of the ports of Algiers and Djen Djen in concession to the United Arab Emirates' DPW group (Dubai Ports World) since 2008. Despite the commitment of this Group to modernise the management system, the situation of the infrastructure in these two ports is far from having improved. The situation has even deteriorated. Boats are stranded for a period of up to seven days, with additional costs of an average of 7,000 dollars per day and per boat, while according to the Algerian foreign trade operators, this waiting time was previously of three days maximum.

Maritime transport companies

Over the last fifteen years, foreign companies have almost exclusively served Algeria. Ship-owners such as CMA-CGM (France), the Mediterranean Shipping Company (Switzerland) or Maersk (Denmark) provide up to 95% of the maritime traffic to and from Algeria. Statistics from the customs department estimate the sea transport

invoice at an average of 25% of the total value of the country's imports. In 2011, Algeria paid about 12 billion dollars in charter fees for an imports value of 45 billion dollars.

Until the end of the 1990s, the Algerian Maritime Company (CNAN) ensured a large part of the services related to the maritime transportation of goods. Since then, it is in decline. At that time it employed about 10,000 persons while in 2003, it only employed about 1,000 persons. Out of the eighty ships owned by the group, only about fifteen remain. Besides, they often have equipment failures. The government has recently decided to revive the activity of this unique national ship-owner. The Council of State Holdings has thus endorsed a program to strengthen the company's fleet by planning the acquisition, for the period 2013-2016, of twelve ships meeting new standards, including six Corno type ships with a horizontal and vertical navigation of a capacity of 6,000 to 8,000 tonnes, four handy size bulk carrier ships of a capacity of 30,000 tonnes and two container ships of a capacity of 7,000 to 8,000 tonnes.

Internal distribution logistics

After their arrival or before leaving the country, agro-food products follow various traffic corridors. Due to the country's vast geography, the connections between regions require long travelling times. Between the North, where the ports and the storage platforms for imported agro-food products are concentrated, and the extreme south of the country, the distance is of nearly 2,000 km. As a result, the supply of inland cities and the greater South requires important means of transportation, adapted in particular to fresh products such as vegetables, meat or dairy products. Due to the lack of a dense railroad network, road transport prevails. The current situation of both road and railroad networks reveal important gaps.

Table 1 - Transport infrastructure

Type of infrastructure	Physical situation
Roads	118,306 km (including national, departmental and rural roads)
Motorways	2,451 km (by the end of 2011)
Airports	35 of which 13 international
Railroad network	4,200 km in service and 6,300 km in progress (quinquennial program 2010-2014)
Ports	40 ports of which 13 only are dedicated to commercial activities

Source: Algerian Ministry of transport.

Predominance of road transport

Although it appears as being the densest of North Africa, the Algerian road network still requires modernisation and densification in order to allow a bigger flow of transport and open up all the regions of the hinterland. At the end of 2011, the length of the Algerian road network was estimated to 118,306 km including different road categories and 2,451 km of motorways (see Table 1). During these last five years, the development program for road infrastructure in Algeria has undertaken the elaboration of two large-scale projects: the east-west motorway and the Trans-Saharan route.

The east-west highway is of an important 1,216 km section whose realisation since 2009 has cost about 11 billion dollars. Connecting the city of Annaba (at the East) to the city of Tlemcen (at the West) and designed in 2 x 3 (two ways and three lanes for each), this megaproject allows the crossing of the northern part of Algeria in an estimated time of 10 hours and will significantly reduce the costs and delivery delays for processed foodstuffs.

The Algerian part of the Trans-Saharan route is the most achieved segment of a vast trans African project introduced in the 1970s in the framework of a UN program related to the establishment of trans African road networks that should extend across the countries of the Maghreb and Sahel (Algeria, Tunisia, Mali, Nigeria, Chad and Nigeria). Due to the lack of financial means and adequate equipment, the project was put to a halt during several years before its re-launch in the 2000s. Algeria is concerned by the construction of 2,800 km of road: 2,410 km have already been established on the Algiers-Tamanrasset border-line with Nigeria; there is only a section of 390 km left to be built. The cost of implementation of this project is estimated at 400 million dollars (Algerian Ministry of Transport).

A developing railroad network

The railroad network extends over 4,200 km. Certain sections have recently been electrified. Still under the monopoly of the state, the sector is managed by the *Société nationale des transports ferroviaires* (SNTF)[2]. Unlike the centre and the south of the country, where the rail transportation is still non-existent, the north of the country benefits from the biggest railroads. The network is mainly made up of 299 km of electrified lines, 305 km of two ways and 1,085 km of narrow lanes.

The government policy for town and country planning gives priority to rail transportation, considered as a major vector for development and growth. The national program for the extension of railroads plans to build more than 6,000 km of railroad network in 2014 and to reach 10,000 km by 2017. The development of rail transportation of goods, with the launching of adequate trains (container railcars, railcars for transport of cereal, etc.) is an essential objective in the program for modernisation that has just been deployed by public authorities. New main railroads in progress will allow connections between the big regional poles such as Bordj Bou Arréridj-Khemis Miliana, Boumedfaa-Djelfa, Touggourt-Hassi Messaoud, Oued

2 - National Railway Transport Company (translator's note).

Tlilat-Moroccan border, Relizane-Tiaret-Tissemsilt, Alger-Annaba, Alger-Sétif-Tizi Ouzou, Alger-Oran, Oran-Tlemcen, etc. The current railroad projects also include electrification of 1,000 km of railroads and the construction of 3,000 km of new railroads.

The development program of the transport sector including both road and railroad should cost about 38 billion dollars in all between 2010 and 2014[3]. As revealed by the above-presented topography of transport infrastructure, the recourse to road transport is almost exclusive for the distribution of agro-food products, and it has an impact on the quality of products, their cost price, or the security of supply. Compared to the populations of the north, the populations of the southern regions (Tamanrasset, Béchar, Tindouf, Ouargla, Illizi, etc.) pay their agro-food products up to 50% more. Convoys of agro-food products take up to five days to reach these regions which are from 1,000 to 2,000 km away from the North, where production and packaging companies for local products and unloading of imported products are concentrated.

Constraints linked to agro-food distribution

Agro-food distribution faces at least three major constraints: the absence of specialised transport companies, the predominance of informality and the deficit in large-scale distribution. Remaining the most used means of transport, road transport reveals such failures in terms of organization and it does not contribute to the efficiency of the agro-food distribution. A big part of the transport market is indeed monopolized by unlicensed operators (informal) and the transportation of fresh products (refrigerated transport) is very poorly developed.

At the time when the economy was centralised, Algeria had a large state-owned road haulage company, the *Société nationale des transports routiers* (SNTR)[4], which supplied the agro-food public offices in different regions. Due to the economic crisis that affected Algeria during the 1990s together with the majority of public companies the SNTR went bankrupt. The financial difficulties weakened its effectiveness. In recent years, the company has launched a new process by establishing, in 2007, about twenty logistics and transport centres throughout the whole territory, and formed a fleet of about 2,000 20-30 tonne trailer trucks.

In the absence of haulage companies capable of meeting needs, agro-food producers develop in-house distribution networks – these networks currently represent 40% of the agro-food transport market, which brings about an additional challenge for companies, especially SMEs. For these small and medium enterprises, transport involves the mobilisation of an important part of their financial means (CETMO, 2011). Nevertheless, these last ten years, goods transportation is increasingly developing within the framework of public initiatives to support new business start-ups and self-employers, the *Agence nationale de soutien à l'emploi de jeunes*[5] (ANSEJ) and the *Caisse nationale d'assurance chômage* (CNAC). However, this impetus, which

3 - Action program of the Ministry of Transport.
4 - National Road Transport Company (Translator's note).
5 - National Agency for the Support of Youth Unemployment (Translator's note).

particularly concerns[6] specialised transport, such as refrigerated transport, is far from taking place in a structured and organised framework. In 2011, the transportation of goods concentrates nearly one third of the projects financed within the framework of the above-mentioned support schemes (ONS, 2012).

Box 1: The Anderson Logistique Group

Among the rare haulage companies created in line with the abolition of state monopoly and the opening of the Algerian economy to private investment, the Anderson Logistique Group gained important market shares in a few years in its field of intervention (road transport, storage, handling and distribution).

With a portfolio of 1,700 customers, 600 employees, 500 vehicles and 8,000 m^3 of storage capacity, the group is present in the 48 *wilayas* of the country. In 2009, the group transported more than 260,000 tonnes of goods across the whole Algerian territory, managed and stored approximately a million m^3 of different products.

In line with its innovation strategy, in 2013, the Anderson Group expanded its activity to freight, with the opening of freight centres across the whole territory. This system, which is common in several other countries, allows the companies to group transport and distribution of their products in various regions with reduced costs. The management of the Anderson Group aims at developing "this mean of transport to the industrial level and to companies enabling them to save more than 30% on their usual transport costs".

The working method of the Anderson group relies on the continued availability of staff and fleet, and the organisation of container transport from harbour facilities and dry ports. To overcome the bureaucratic gaps, the group adopted a strategy to facilitate the access authorisations to ports and the organisation of convoys. By 2015, the group aims to create a park for logistic activities.

Large-scale distribution

Large-scale distribution is an emerging sector in Algeria. The retail trade remains dominated by general food-stores and street hawkers (weekly markets or corner shops). The country has two supermarkets (Uno City, Cevital group, both in Algiers) and three hypermarkets, two of which are owned by the Cevital group (Uno in the region of Aïn Defla and Uno Shopping Center in Bouira) and the Arcofina group owns the other one (Ardis in Algiers). Several other supermarkets are under construction, in particular within shopping malls (Ubifrance, 2012). Uno and Ardis aim at opening other hypermarkets across the country but these projects are being developed very slowly. Fresh products such as meat, vegetables and fruit remain either the privilege of specialised stores, or are sold on traditional markets or through informal circuits that are very vast in the case of this type of products.

6 - National Insurance for Unemployment (Translator's note).

Box 2: Agro-food logistics organization in the Cevital Group

Being the leading agro-food group in Algeria and third in Africa, the Cevital group monopolises more than 60% of the Algerian market in terms of sugar and vegetable oil, with the aim to start exporting commodities. The production capacities of the group are rapidly growing. Currently, the company produces about 210,000 tonnes of sugar per year, 3,6 million bottles of mineral water and fruity drinks per day and 80 tonnes of canned tomato and jams per day. The Group's agro-industrial units are in Bejaia. Located 250 km East of Algiers, the port of Bejaïa has harbour silos of a total capacity of 182,000 tonnes and an unloading terminal of 2,000 tonnes per hour. It is the most important unloading terminal in the Mediterranean (Hafsi, 2011).

Cevital's development policy includes the implementation of a strengthened internal logistics network: upstream, the Group equipped itself with a maritime fleet ensuring the supply of raw materials (oil and unrefined sugars); downstream, it has established a vast network of transport, storage, large-scale and wholesale distribution, across the entire territory.

The logistics and distribution sector of the Group is organised in four subsidiaries:

1) Nolis: created in 2000, this subsidiary is in charge of sea transport. Thanks to three owned ships and to other chartered ones, the company ensures the transportation of imported raw materials of the Cevital group, in particular from Latin America.

2) Numidis: created in 2006, this subsidiary is specialised in large-scale distribution. It is planning to develop of a chain of supermarkets and hypermarkets under the Uno City and Uno brands.

3) Numilog: created in 2007, this subsidiary offers a global logistic solution including road transport, storage and inventory management, packaging, co-packing and labelling.

4) Sierra Cevital: created in 2011, this subsidiary is a joint-venture between the Cevital group and Sonae-Sierra, specialised in developing and managing shopping malls (market studies, feasibility, coordination of the establishment of shopping malls, optimisation of commercial mix, management of centres).

Conclusion

As determining factors in the development of agribusiness, Algerian transport and logistic infrastructure should be re-structured. Indeed, important projects are underway (the modernization of harbour facilities, the development of railroad and road networks, etc.), but a global strategy able to guarantee, in the medium and long term, the complementarities between the various logistic sectors and an intraregional homogeneity, is still lacking.

The establishment of new agribusiness trends is also imperative through the generalisation of large-scale distribution, thus allowing supply availability and regularity, a necessary condition for the eradication of informal trade, speculation and fluctuation of prices.

Lastly, the removal of bureaucratic obstacles, in particular those related to international trade will contribute to the modernisation of the logistics sector. This will in turn make Algeria a more attractive destination and reduce transaction costs that penalize economic operators and consumers.

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CHAPTER 20

MALTA: A LOGISTICAL HUB

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Malta's food security problems date from Medieval times, when Malta was unable to sustain the food demands of its local population and an appropriate institution was set up to oversee and ensure the annual supply of grain to the island. With the arrival of the Knights of Malta in the sixteenth century, a tradition of a large expat population commenced that, passing through the French and British periods, kept on until today to include both an important expat population and a growing number of tourists.

Over the centuries, with an increasingly heterogeneous population and sustained demographic growth in a tiny territory, the population density, one of the highest in the world, wrought important changes in its physical infrastructure (increase in the number of roads, growth of its sea and air ports). The Mediterranean centrality of Malta's position turned the islands into a hub of ship chandelling and as a repair base, first for military use and later for increasingly more commercial uses. Since independence, gained in 1964, Malta has progressively transformed itself into an international logistical trade centre, where agro-food products are imported, exported and as transhipment goods.

Development of Malta's agro-food infrastructure

Malta's association with the sea is a natural one for an island, all the more for one that has inherited a history of sea-driven geo-economic factors. Its central Mediterranean location made Malta an ideal stepping-stone into or out of Sicily (during the Punic Wars; at the time of the Arab invasion of Sicily), or as a fortress island (for the Order of the Knights of Malta and for Britain). More recently it translated into the Maltese Islands having a substantially large population relative to its size.

Origins of Malta's infrastructure

Since Medieval Times, the islands producing limited quantities of food, importation was essential to feed the local population. Throughout the Medieval and Modern periods, Sicily remained the main source for staple foods, providing grain to Malta. The *Università* at Mdina negotiated and guaranteed sufficient provisions of wheat

for the islands throughout a calendar year, through the management of the *Massa Frumentaria* fund (Consiglio *et al.*, 2012, pp. 25-26)[1]. The Order of the Knights of Malta would then integrate it into their administration, eventually hosting it within Valletta[2]. It would later also administer the granaries, now disused, that are still to be found around the island, in particular those at St. Elmo and outside Valletta. The presence of the Knights in Malta, with their European cultural baggage and the variety of their tastes, created an increase in the demand and the variety of food (Cassar Pullicino, 1960), encouraging the development of import trading routes from traditional Mediterranean seaports: Marseille, Barcelona, Messina, Genoa, Naples and Brindisi. The Knights brought, together with their wealth, food requests suitable to their lifestyle and eventually more exotic foods imported for local consumption (wine[3], sugar, coffee, cocoa, iron nails and glass [Debono, 1988]), and also ice from Mount Etna to make refreshing preparations during the warmer months (Cassar Pullicino, 1960).

On leaving Rhodes in 1523, the Order of St. John was a sea-based order and in Malta, where they arrived in 1530, the Knights replicated their Rhodian example. The Grand Harbour was developed and extended to meet the growing trade, with improved logistics and ship facilities. The other side of Valletta, the future Manoel Island, in Marsamxett Harbour, had been used since Medieval times to issue a clean bill of health[4] to ships, which the Knights would transform into a fully-fledged quarantine station (*Lazzaretto*), creating a new revenue stream, as a clean bill of health issued by Malta was sought after by ships moving on to other, European ports (Galea, 1966). By the eighteenth century Malta's main recorded high-value exports during the period were cotton (Vella, 1966; Debono, 1988) and oranges (Blondy, 2003), then a developing luxury good, before it became a consumer good in the nineteenth century, and its derivative orange blossom water[5]. This trade necessitated a development in conservation techniques such as specifically designed boxes to prevent damage to the goods[6].

As often happens, the local population emulated its masters, thus accelerating the demand for new goods, with meat imports increasing, as fish would over the years become associated as a poor man's meal. Meat remained scarce on the island, consumed by the more affluent parts of society, with the exception of local wild rabbit, which by the end of the eighteenth century was domesticated and household bred, becoming Malta's national dish.

1 - The fund would eventually be wound up on 24 June 1994 (see U. J. Rudolf and W. G. Berg, *Historical Dictionary of Malta*, Lanham [Md.], Scarecrow Press, 2012, p. 36).

2 - At the aptly named Dar Annona, based on Ancient Rome's free distribution of food, the Annona, deriving from the Latin *Annus*, the annual product of a year, and the goddess of wheat Anna Perenna (Temin, 2013. p. 31).

3 - "Well back into the fifteenth century, much before the Order had come to Malta, to satisfy this need the island had depended for its supplies on the markets of Sicily rather than elsewhere" (Debono, 1984, p. 74).

4 - Referred to as *purifications*.

5 - The sweet variety having been imported into Europe via Portugal, and implanted early in Malta.

6 - In the same manner that wine and perfumes were imported in jeroboams (Blondy, 2003).

From Mediterranean to Global Trade

The British period in Malta witnessed both a continuity and change in importation and exportation routes, and renewed the development of its infrastructure. Maltese cotton export was discouraged in favour of cotton from Egypt and India, the cotton industry already being seriously affected during the French Revolution, with the Spanish market being closed[7], and the effects of the Napoleonic Continental Block limiting direct imports from British-held Malta.

Throughout the nineteenth and twentieth century Maltese tastes came to encapsulate a growing demand for British foods and brands: Cadbury chocolates, tonic water, beers and ales also locally produced, and thus needing large imports of hops, jams, marmalades, traditional British sweets and cakes, initially requested by the growing numbers of British servicemen and their families.

With Malta becoming the fulcrum of the British presence in the Mediterranean, technology changed from sail ship to steam-powered ships, necessitating frequent coal bunkering. Malta fully met the requirements of a repair and supply centre, leading the British Navy to make the islands the main provisioning centre for its ships, with a bakery supplying the British Mediterranean Fleet. When the Suez Canal was opened in 1869, the Mediterranean transformed itself into a global trade route, encouraging the development of trade links along the British colonial route. The ports on both sides of Valletta were then further embellished, with an ever-developing dockyard that kept on growing through to the twentieth century and became a political bone of contention in post war Malta, until its recent privatization in 2010.

Beyond goods, the ports of Malta witnessed the departure of a considerable number of people. Taking advantage of forming part of the British Empire, many Maltese travelled and settled in other Mediterranean areas. From Alexandria to Gibraltar, from Tripoli to Venice, the Maltese trading network grew, with the periods running from 1869 to the 1880s marking an economic golden period for the islands and its various trading diasporas. By the middle to the late twentieth century that network grew to encompass Australia, to which a secondary trade route of re-exports and re-imports evolved.

Socio-economic effects of post war decolonization

The post Second World War and the subsequent economic throes of Britain (still on ration cards until the early 1950s) affected Malta directly giving rise to high unemployment instigating more and more Maltese to emigrate, mainly to the UK, USA and Canada. While food supplies did not take long to be restored in Malta, the economy was in a difficult situation. During the late 1940s to the 1950s, an important sector of the rural population of Malta, originating from the vast countryside between Mosta and Mgarr, the northern area around Mellieha and Gozo, emigrated. Maltese inheritance tradition, particularly in the rural areas, signified an increase in land fragmentation, limiting returns and diminishing the possibilities for economies of scale. For large families, emigration for their children ensured continuity at home and opportunities abroad.

7 - Barcelona having been one of the important export nodes for the cotton trade.

In the late 1950s there was now consensus along most of the Maltese political spectrum that Independence from Britain was a necessity. The most important concern was how to transform and diversify an economy whose trade and infrastructure had for decades been built on war and sustained by an Empire. By the time Malta became independent in 1964, its sea routes were largely dependent on those forged under the British Empire, now turning into a "modern" Commonwealth after the 1949 London declaration, and the natural neighbouring routes with Italy. The portentous changes in North Africa, including Tunisian, Algerian and Egyptian independence meant that many Maltese in those countries had to emigrate to France and to the U.K. By the Seventies, they also departed from Libya (Malta imported a variety of Italian foodstuffs from Libya, until the changes under Ghaddafi ended that trade). Trade dynamics had changed and so had Malta[8].

Independence obtained, the Maltese population had to survive with government support including subsidized flour. The war-focused economy was transformed into one built on manufacturing industry, construction and tourism. The latter added further strains to an economy that imported all its food needs, for the growing influx of tourists placed further food demands, while at the same time food price hikes had to be contained not to affect too adversely the cost-of-living.

Malta's bid for EU membership in the eighties must be seen also as an opening of the economy not only to a wider and more transparently regulated system, but also to allow the importation of a wider variety of goods, including foodstuffs, since the central command economy of the 1970s and 1980s had stifled diversity in locally-produced food items.

Malta's development into an EU commercial hub

On the eve of Malta joining the European Union, the trading infrastructure of the country was under direct government control, as it had been in the previous colonial period. A Freeport had been developed in the southwest of Malta, attracting many container ships for transhipment business and complementing the Grand Harbour facilities and the country's importation needs, channelling exports for its niche manufacturing industry. A new airport terminal was built and an international cruise and ferry port created. Following its bid to join the EU, the country witnessed a large privatization programme of its infrastructure, ushering in a new growth in commerce. Continuity of trade over the centuries, together with continuous improvement and development of the infrastructure placed Malta in an ideal situation to exploit its geographic position, in a liberalized market, backed by important legal, fiscal and maritime reforms, which EU membership further accelerated. The reforms included changes in the company law in 1995, continuously updated, promoting exports, legal and financial services (representing 12% of Malta's GDP in 2012), and maritime (the Maltese maritime flag is the second largest in Europe and

8 - Malta had a self-government constitution since 1921, suspended before the Second World War and restored in 1947, wherein all foreign matters were handled by Britain.

the seventh largest in the world) and aviation services (both registration and technical services, with Lufthansa Technik and SR Techniques having important set-ups in Malta). In retrospect, these reforms have been of enormous benefit to the country, allowing it to navigate in safe waters through the financial crisis and the euro crisis.

The Logistical facilities

The Freeport

The plan for a container terminal in the southwest of Malta, at Kalafrana, was put forward soon after independence in 1964, but delays in execution and the British continued military presence until 1979, meant that work on the quays only began in the 1980s. The Malta Freeport was thus established in 1988 primarily as a transhipment hub and is today one of the largest transhipment ports in the Mediterranean. As of 2004 the operation of the container terminal was privatized with a thirty-year concession agreement to Malta Freeport Terminals Limited, a subsidiary of CMA-CGM, eventually extended to 65 years. The government retains an overview on its operation through its Malta Freeport Corporation Limited.

The container terminal has seen constant growth in recent years, with the majority of goods transiting through transhipment trade, thus encouraging investment and infrastructural works, and the extension of terminal one to nearly double its length. By its very nature, the Freeport's business is ancillary to Malta's direct container imports and exports. Its great asset is the number of ports served, covering major international ports.

An important amount of goods are manufactured locally for the export market, mainly for non-EU and extra-Mediterranean ports, with other nearby destinations to the north and northwest (Italy, France and Spain) of Malta also handled by the Valletta Gateway Terminal in the Grand Harbour.

In the case of agro-food exports, there exists a concentration of Maltese brands, which have built their commercial model relying on the availability of good infrastructure. Foster Clarks is a dedicated export factory manufacturing powders for instant drinks, baking products, sweets, jellies, food additives, jams, generating 60 million euros worth of sales. Consolidated Biscuits Ltd. produces a range of biscuits, confectionery products and snack foods (annual sales of 7 million euros), all for the export business. The Magro Group, on the island of Gozo, has built their business on food processing, initially with tomatoes and its derivatives, and now includes dairy products and traditional agro-food products of Gozo, again targeting exports (annual sales of 10 million euros), their logistical organization more fine-tuned to the transfer of products are transferred first by local ferry between Gozo and Malta, and then directed to one of the ports for final delivery. Any slowdown along the way translates into lost revenues.

Wine is one of the products the most traded by the Maltese. With Malta joining the EU and growing pressure to upgrade the quality of the grapes and the local oenological industry, Maltese wine producers have also developed a small but growing

export business. On the other hand wine imports are 15 times higher than exports, of which the bulk, 70%, originate from Italy and France, followed by Chile (7.1%) and South Africa (4.2%) (UNSD, 2013). There is also a growing beer export market, that includes a slowly developing, but still experimental Chinese market, together with an established Australian market (49.1% of export destinations) (UNSD, 2013), fuelled by the Maltese diaspora living there. The notable difference with wine is that the majority of the required ingredients are exogenous to Malta and have to be imported.

The Airport

Before World War II Malta had a number of civil airfields, but in the post war period and consequential war damage to the airfields, activity concentrated at Luqa airport, with a terminal inaugurated in 1958. By the 1980s, with the push for tourism and the need to improve international connections a new terminal was planned and inaugurated in 1992, with the Malta International Airport being privatized in 2002. Apart from a remarkable growth in passenger transport[9], the airport has sustained cargo movements, primarily to EU destinations, the Middle East and Libya. Topping the list of cargo destinations between 2009 and 2013 were Marseille, Dubai, Frankfurt and London-Heathrow, with improved flight connections and Malta joining the Eurozone in 2008, assuring Marseille's growth as a major cargo hub.

Table 1 - Top destinations for air cargo movements 2007-2012

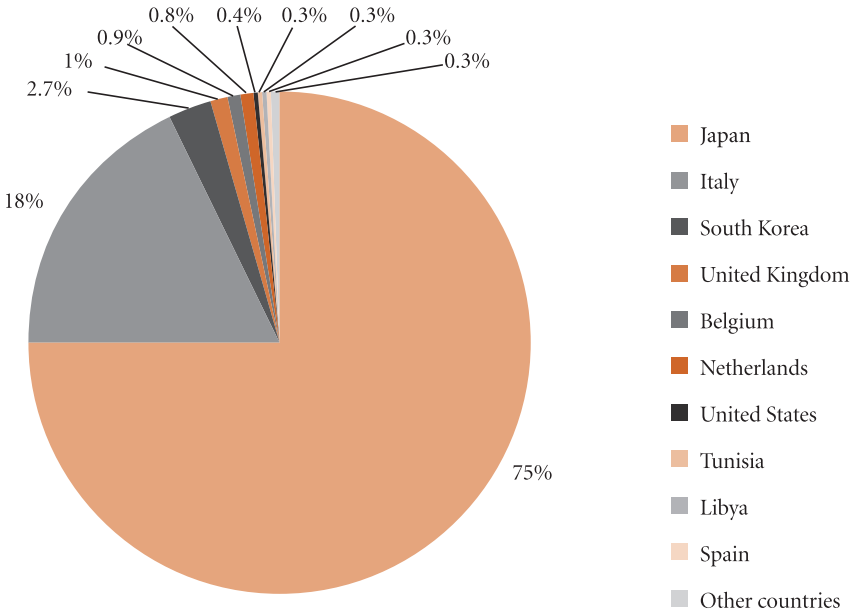
	2012	2011	2010	2009	2008	2007
Marseille	3,349,172	2,909,681	2,298,046	1,675,549	273,844	8,363
Dubai	2,491,438	2,670,565	2,912,805	2,500,168	2,493,774	2,181,149
Frankfurt	2,418,403	3,135,936	3,678,642	3,508,594	3,865,610	3,837,507
London	1,184,524	1,495,282	1,417,771	1,318,735	1,493,065	1,415,479

Source : Malta International Airport (2013).

The airport enjoys an important and lucrative cold stores trade, with fish export topping the list in terms of value at 33 million dollars. Top grade fish is sent from the aquaculture farms to Japan by air-freight and lower grade fish is processed by ships directly at sea and sold regionally. The aquaculture farms need constant monitoring and have to be regularly moved when exposed to strong waves and winds, requiring considerable organisational expenses. As can be seen in Figure 1 below, Japan is the recipient of 75% of this trade, valued at over 57 million dollars, split between fresh fish (56%) and frozen fish (36%).

9 - An increase of 17% between 2008 and 2012 (Malta International Airport, 2013).

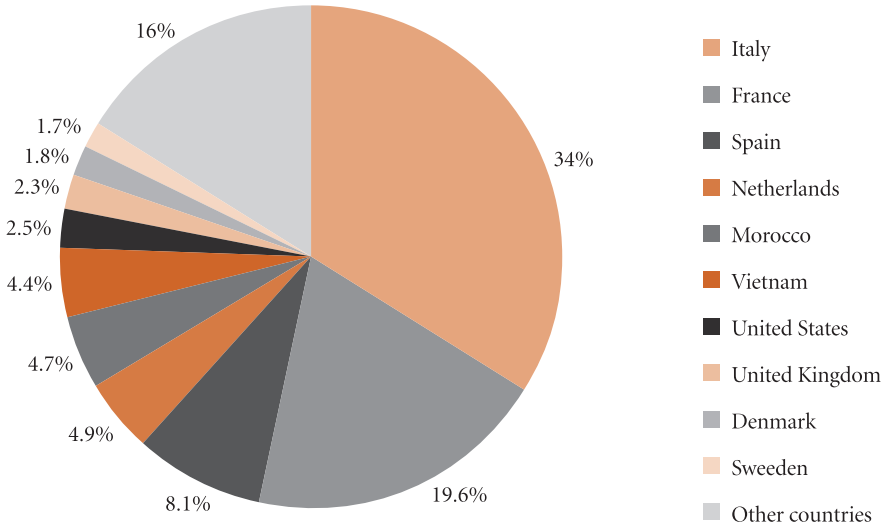
Figure 1 - Top 10 destinations of Maltese fish exports in 2011



Source: UNSD (2013).

The Italian market also constitutes for Malta an important export market (18% of fish exports, valued at 13 million dollars), nearly all of it fresh fish. Italy remains Malta's main source of fish importation, at 34% of fish imports, but it is nearly equal in terms of value (11 million dollars), half being live fish and a quarter being frozen fish (see Figure 2).

Figure 2 - Top 10 Countries exporting fish products to Malta in 2011



Source: UNSD (2013).

While for destinations such as Italy, fresh fish can be sold and delivered at sea, for the more distant destinations, the airport is of major importance for the fish export

business, particularly for the Blue fin tuna (*Thunnus thynnus*), the main species directly exported to the Japanese market by airfreight and having significant economic importance to Malta.

The Grand Harbour facilities

The Grand Harbour has RoRo (Roll-On/Roll-off) and container facilities, and is also the point of departure of near daily connections with Sicily, satisfying an increasing local demand for the importation of fresh produce. These facilities have all been privatized on long term lease agreements: the cruise and ferry terminal since 2002 on a 65 year lease to Viset plc, the Valletta container reception area leased since 2006 to Valletta Gateway Terminals, trade being mainly conducted with Italy and Tunisia.

Since joining the EU, Malta's road freight trade has increased, particularly with Sicily, Salerno, Livorno, and Genoa. Unfortunately, detailed statistics are hard to come by as Malta has obtained derogation on the obligation to collect road freight statistics[10]. The removal of customs barrier has accelerated the speed of deliveries, allowing the further development of fresh and chilled food importation from Europe. One can term this the Lidl effect, as since its implantation in the Maltese territory the chain has developed a business model based on the fresh and chilled produce reaching Malta from Sicily through the Pozzallo-Valletta ferry, only an hour and a half away. Other known supermarket names have either anticipated this change or followed suit, with Crai, Conad and Carrefour literally invading the island with their food offerings, prompting a reaction by smaller supermarkets, which have teamed up and invested into their own road freight equipment, to effect weekly imports from Sicily.

Given economies of scale, the imported fresh and chilled foods are now competing with local produce. Local dairy products prices are now being price-matched by the imported products. Local consumers, of whom 5% are long-term foreign residents[11], help fuel this demand.

However, in a small densely populated country, lacking direct industrial hinterland and sufficient rural resources, there exist inherent risks to its food supply. Bread is a staple product of the Maltese table. 95% of Malta's flour needs are satisfied through the importation of hard wheat from the USA, and for soft wheat from the EU. Since 1994, the different mills in Malta merged into a single entity, Federated Mills plc. having a *de facto* monopoly. In 2007, with government subsidies still in place they were allowed to increase their prices, notwithstanding the growing supermarket competition of frozen oven-ready bread preparations[12].

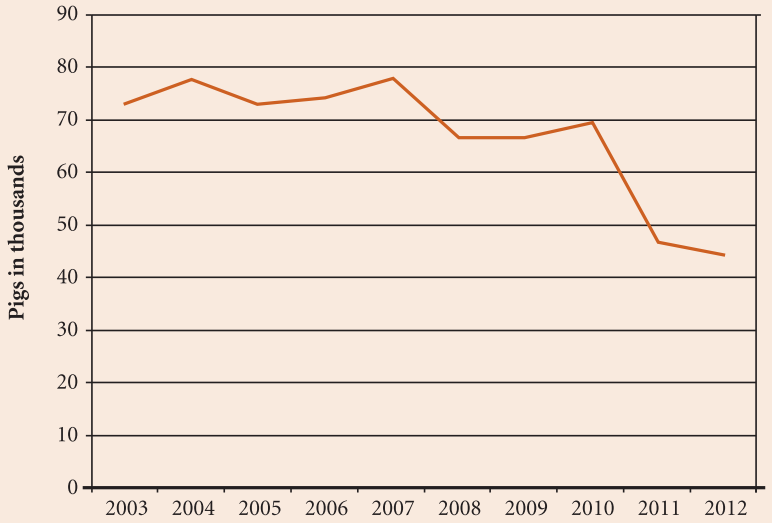
10 - EU Regulation 70/2012 does not apply to Malta so long as the number of Maltese-registered goods road transport vehicles licensed to engage in international transport does not exceed 400 vehicles.

11 - Eurostat figures as at July 2011. The numbers have been increasing, as in 2010 4% of the population were foreign residents. Half of these figures are non-EU citizens.

12 - With government subsidies and fixed-pricing for bread still in place in 2007, Federated Mills had wished to increase prices. At the time, the Director of the Office for Fair Competition had deemed it was an abuse of Federated Mills' market position. Federated Mills subsequently asked for a review of this decision, and in a landmark ruling the price increase was justified, notwithstanding the growing supermarket competition of frozen oven-ready bread preparations.

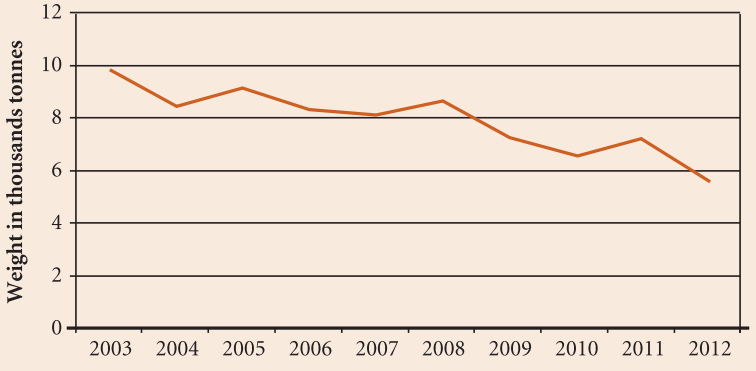
The availability of cheaper priced imported food items has had a negative effect on other local produce. Notwithstanding the renown local pork carries, recognized as one of the staple and good quality products for many years, figures in head count and slaughtered pigs have been seriously affected. From 2010 to 2012 the pig population dropped by 35% (see Figure 3) and pigs slaughtered for human consumption by 25% over the same period (see Figure 4), under the combined effect of the increase of the price of feed, the lack of economies of scale and price competition.

Figure 3 - Pig count population in Malta



Source: Eurostat (2013).

Figure 4 - Total weight of pigs slaughtered in Malta



Source: Eurostat (2013).

The Grand Harbour infrastructure gives added flexibility and resilience to Malta's logistical and commercial offering, going hand in hand with the transhipment and container business to the southwest of Malta, with the airport at Luqa equidistant from both ports. It is this suppleness that has encouraged the development of niche

value-added industries, requiring English-speaking skilled and semi-skilled workers, with several delivery options.

Conclusion

From the sixteenth to the twentieth century Malta has evolved from a military-oriented logistical infrastructure to one based on trade, endowing the country with important assets, to which new developments were added. For the foreseeable future, Malta will remain dependent on food imports and value-added agro-food exports, which, with the exception of high-value goods conveyed by air, rely on maritime transport.

The growing resident population of the Maltese Islands is a concern for the long-term sustainability of its infrastructure without committed vision to its maintenance and continuous improvement. An evident risk is the island of Gozo, where the reliance on the regional ferry is absolute. The greater the local food demand, in a territory where local produce has been diminishing annually, the greater the risk of further increase in food prices, which is bound to have considerable socio-economic effect.

While the ports seem to be sustainable and have space for further growth, two serious threats exist. The internal road infrastructure, notwithstanding the upgrade of some arterial roads, is in need of further investment and planning[13]. Import and export trade is increasingly built on "just in time" models, with delays in logistics adding to the difficulties of trade, and in the case of agro-food products, the risk of lack of food supplies.

The second risk is energy. Malta is fully dependent on oil for its sea, air and land transport, and for the generation of electricity[14] required to run terminals and factories. The cost of oil is directly correlated to commerce and the logistics industry of Malta. Putting aside the obvious environmental concerns, the energy situation in Malta needs to be addressed on three fronts: diversification of supply, guarantee of supply and large-scale investment in renewable energy. Solving electricity generation will improve economic sectors reliant on water supply, including agriculture, industry and tourism, as 56% of Malta's water is produced through electricity hungry reverse osmosis plants. Added to the above are the potential adverse effects of EU legislation including the introduction of more stringent carbon taxes on logistics and on food, and the probable European penalties inflicted on Malta[15] for not meeting the EU's Energy 2020 objectives.

The government formed after the elections of the 9 March 2013[16] will have the difficult task of balancing the continued growth of Malta's commercial and logistical infrastructure, streamlining its electricity generation, including water recovery

13 - Public transport, privatised in the summer of 2011, has until now failed to deliver the expected decrease in traffic congestion, and the introduction of larger and longer buses have proved to be difficult to manœuvre in many of Malta's narrow roads.

14 - In the EU, only Cyprus is until now oil dependent for electricity generation. Eurostat.

15 - Malta lags far behind the other EU-27 states in its share of renewable energy. Eurostat.

16 - On 10 March 2013, the Partit Laburista of Malta won the elections with a 55% majority.

programmes, with an international background of socio-political uncertainty in its southern Mediterranean trade partners and in a difficult socio-economic setting facing its northern European and some Euro-denominated member states. Indeed, Malta's agro-food trade will remain tightly linked to developments in the Euro-Mediterranean area. Agro-food logistics manifest, in the contemporary Maltese scenario, the importance of the maritime routes, which, over the centuries, transformed the Mediterranean and Malta, and will in the years ahead, continue to condition regional and local socio-economic progress.

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CHAPTER 21

INFRASTRUCTURE AND AGRO-FOOD LOGISTICS IN EGYPT

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Accounting for 17% of the economic output, the agricultural and agro-food sectors are fundamental for the Egyptian economic sector. Despite the numerous development plans and growing international exports, the sector is plagued by various problems including large quantities of harvest losses, deficiencies in the irrigation systems and the existence of a two-speed agriculture. In fact, on the one hand, Egyptian agriculture has a rather modern export-oriented production chain while on the other hand, the production used for local consumption needs to be modernised. It is also important to note that Egypt is the world's biggest wheat importer with about 10 million tonnes a year.

This chapter will present the current state of Egyptian agriculture, agro-food industry and logistics developments before addressing the goals of the government's strategy. The last part of the article will focus on policy outcomes and expected future trends.

An increased competitiveness in international markets

The current state of Egyptian agriculture and agro-food industry is characterised by an increasing competitiveness of agricultural products in international markets. For a long period of time, Egyptian exports were primarily confined to cotton, rice, onion and citrus. Since the mid-1970s, exports have experienced a striking change. Exports have diversified, the export market has expanded and export returns have increased. The total annual export earnings of the aforementioned four crops amounted to approximately 1,230 million dollars during the transitional period of the three years (2005-2007 that marked the beginning of trade liberalisation and export diversification). This represented 50% of the total export earnings while other crops such as vegetables, fruits and medicinal and aromatic plants represented the other 50%. On the other hand, export markets have not been confined to Arab and

European markets but have indeed expanded to include other international markets like the African and Southeast Asian markets.

The logistics infrastructure and strategic plans

Egypt is surrounded by the Mediterranean Sea in the north and by the Red Sea in the south. Furthermore, the presence of the Suez Canal has allowed the country to become a hub for international trade. Nevertheless, Alexandria, Port Said, Suez and a few other small harbours have been the traditional seaports. The following Table shows the new harbour facilities in Egypt that provide for a promising boom in international transportation.

Table 1 - ISPS Code of Egyptian Ports

Port Name	Port ID Number	Approval Date
Alexandria Port Authorities		
Alexandria Port	14726	17-Jun-2004
Dekheila Port	17350	17-Jun-2004
Damietta Port Authorities		
Damietta Port	17373	13-Jun-2004
Port Said Port Authorities		
Port Said Port	14867	17-Jun-2004
Arish Port	0057	16-Sep-2004
Port said East Port	–	–
Red Sea Ports Authorities		
Suez Port	14928	24-Jun-2004
Adabieh Port	14689	24-Jun-2004
Safaga Port	17891	24-Jun-2004
Hurghada Port	–	–
Sharm El-Sheikh Port	–	–
Sokhna Port	219475	8-Jul-2004
Noueibah Port	–	–
Al-Tour Port	–	–

Source: International Maritime Organization (IMO), ISPS Code (www.imo.org/ourwork/security/instruments/pages/ispscode.aspx).

Until the 1980's, only the Cairo and Alexandria airports offered international flight services. Today, the Egyptian airports of Luxor, Asyut, Borg el Arab, Cairo and

Alexandria all offer international flight and cargo services. Several other airports have been opened in the Sinai, the Red Sea, Abu Simbel and East Owainat. Cairo Airport has a perishable fruits refrigerated terminal that makes the airport a hub for re-exportation. Another refrigerated terminal is planned in Luxor Airport to receive the winter production exports from Upper Egypt.

Although railway is the first means of transport in Africa and the Middle East, it still suffers from several problems related to the lack of maintenance and investment for improvement. Railway development could be a major project allowing cheaper and safer transportation, especially with the introduction of refrigerating facilities. The road network also requires large investments to allow efficient land transportation. A ring road was built around each major city and the second ring road around the Greater Cairo area is under construction. Besides, a free road was constructed on the east of the Nile and another one on the west bank aiming to link Alexandria with Aswan. A road that links Egypt and Sudan is about to be opened on the west of the Nile and another one is planned for 2014 on the Red Sea coast. A bridge over the Aqaba gulf of the Red Sea is also planned to connect Egypt and Saudi Arabia. Several efforts have been made to improve logistics but there is still a long way to go.

A new national project called Suez Canal Axis comprises a regional development scheme for the region of the Canal including large areas from five governorates, namely, Port Said, Ismailia, Suez, North Sinai, and South Sinai. This project will establish a free zone in this district with all the necessary facilities to enhance international trade, re-exportation, and related activities. Another plan called the "development path" is being examined. It involves the construction of a free road going from Mersa Matrouh on the Mediterranean coast in the North to Wadi Halfa on the border with Sudan with links to major cities in the Nile Valley and Delta. All along the "path" there are several industrial, mining, agricultural and touristic activities that depend on the natural resources of the location. This plan aims at encouraging the migration of the heavy population settled in the old land of the Nile Valley to new sustainably developed locations in the underutilised desert areas.

The role of agro-industries

Although the growth rates of agro-industries are still below expectations, the last two decades have witnessed a significant increase until 2010. Many agro-industrial units such as juices, jams, frozen and dried vegetables adopting the latest techniques have been established. These products are now meeting world quality standards and capable of accessing several foreign markets. The fact that the processing industry has not been only limited to the direct processing of agricultural products but has also expanded to include several inputs such as packaging material, fertilisers, pesticides, and irrigation supplies is noteworthy. These achievements have led to a significant increase of processed agricultural products.

Rural livelihood

The income levels of agricultural activities have significantly increased during the last two decades. Net returns per *feddan* (acre) at constant prices have increased from an average of Egyptian pounds 684 from 1980-1985 to about Egyptian pounds

1046 in 2007, i.e. at an annual rate of increase of about 1.7%. However, the sharp decline of agricultural holdings during this period is a decisive factor that has detracted from achieving higher rates of income. Fragmented holdings of less than one *feddan* increased to 43.5% of total agricultural holdings, against a far less percentage in the first five years of the 1980s.

Box 1: Interview with Tarek Tawfiq

Tarek Tawfiq is the former President of the Egyptian Chamber of Food Industries, Union of Egyptian Industries.

What place do local agricultural and agro-food products occupy in the Egyptian economy?

In Egypt, the activities that are directly or indirectly related to the agricultural and agro-food sector account for some 17% of the Egyptian economic output. This shows the ever-growing importance of the sector, especially given the fact that the country has a problem of food insecurity and that food imports outstrip food exports by about 30 billion Egyptian pounds (EGP). Annual food exports amount to 27 billion EGP while food imports amount to almost 60 billion EGP. Furthermore, the agricultural and agro-food sector play a crucial role in the labour market, which directly or indirectly, absorbs over half the active labour force in Egypt.

What are the major problems regarding transport logistics for agriculture and the agro-food industry in Egypt?

You cannot generalise about this question. On the contrary, it needs to be tackled with considerable caution because in Egypt, we often face two diametrically opposite situations. Some sectors are organised to some degree but others are the same as a hundred years ago. Be that as it may, the wastage of agricultural products due to inadequate transport facilities presents a real logistical problem. According to official statistics, 15 to 20% of crops harvested are lost or wasted. Worse still, in the fresh fruits and vegetables sector, losses related to transport and storage range from 25 to 50% of the harvest. Nonetheless, it is important to point out the fact that the production and marketing chains for food exports have improved enormously over the last ten years. On the other hand, food products for the local market suffer from several shortcomings, especially the lack of modern river transport and retail outlets to meet the required standards. In this regard, the vast majority of these outlets operate within the informal sector.

What do Egyptian exporters of agricultural and agro-food products need to do above all in order to improve quality?

Despite the tangible progress, this sector is still handicapped by bureaucracy. That is why it is high time the government tackled the problem and reviewed the organisational and legal framework of the production, conservation and distribution of all consumer food products for foreign and domestic markets and enhanced the value of agricultural and food-food products. This development should also be incorporated in the general framework of food safety. Problems should not be addressed on a case-by-case basis and in an incomplete way. At the same time, other equally important measures need to be taken, such as:

- The implementation of mechanisms to encourage investment in newly reclaimed land and farm it properly;

- The stimulation of current irrigation systems, especially the improvement of those used in traditional farming and ensure that they match up to the farming practices introduced in the newly reclaimed land in arid regions;
- The development of Egyptian farming laws and their inclusion in international intellectual property instruments;
- The promotion of practical scientific research that meets the needs of the agricultural and industrial sectors;
- The implementation of the Act on the Food Safety Agency and the review of all current legislative instruments with the aim of consolidating them;
- The development without delay of the retail sector, which is still the most backwards;
- Lastly, the emergence of a culture in which all operators adhere to an ethos of quality and food safety, wherever the products are destined needs to be ensured.

Interview by Hassane Tlili, Journalist Consultant for the CIHEAM, published in the CIHEAM Watch Letter, *20, April 2012, pp. 24-25.*

Improving the competitiveness of Egyptian agricultural products

However, many issues undermine the competitiveness of Egyptian agriculture, including harvest losses, deficient irrigation systems and the compliance with sanitary and security standards.

The Egyptian Sustainable Agricultural Strategy towards 2030

In order to address these issues, many initiatives have been taken to increase the competitiveness of agricultural products. The most recent one was the Egyptian Sustainable Agricultural Strategy towards 2030, launched in 2009 by the Agricultural Research for Development Council of the Ministry of Agriculture. However, the frequent changes in government and the security problem in the country have substantially delayed the implementation of this strategy.

The first target of the Egyptian agriculture strategy regarding competitiveness is to improve the quality of agricultural products to meet market requirements; to establish and apply quality standards for agricultural products, to expand the application of sorting, grading and packaging processes; to utilise modern information and telecommunications technologies; to further develop marketing facilities and services; to use pre and post-harvest practices in order to enhance product quality and marketing efficiency; to apply modern techniques and practices in monitoring, analyses and the prediction of natural and marketing risks and to develop risk mitigation measures; to rationalise the regulatory role of the government in exercising control over agricultural inputs and outputs policies, as well as in consumer protection; and lastly, to link the production to market chains.

The agricultural sustainable development strategy includes detailed policies and working programs aiming to improve marketing efficiency, increase agro-industries and reduce pre- and post-harvest losses to half their present levels. The introduction of more efficient and targeted support policies will play an important role in the implementation of a rational food policy.

Shortcomings in agro-industries

The agro-industries subsector is characterised by several shortcomings. The first one is related to the low percentage of agricultural products that benefit from processing, preservation, preparation and industrialisation and the decreased attention given to rural industries. The second one is the limited capacity of the traditional agro-industries subsector compared to commercial brand names, multinational and large farms, thus leading to haphazard and unsystematic practices in agro-industries in what is known as the informal sector. This sector is not subjected to official supervision and control. The third shortcoming is the prevalence of low-quality goods and adulterated products leading to serious health risks. These kinds of products are estimated at 70% of processed agricultural products.

The other shortcomings include: the inadequate attention given to the processing and recycling of agricultural residues that are a wasted economic asset, in addition to being an environmental hazard; the poor enforcement of applicable quality standards, laws and regulations of processed products; the weak complementary contractual relations between producers and traders, with the latter depending on what is actually produced and not on the kinds and varieties that are suitable for processing; and the limited application of the idea of establishing integrated agro-industrial communities for small farmers in the framework of the new agricultural projects and the newly-reclaimed areas.

Reducing pre- and post-harvest food losses

The main constraints faced by horticultural crops intended for export were identified by the Egyptian strategy for sustainable development as follows:

- The lack of availability of packing-houses, including pre-cooling and cooling facilities, and of refrigerated trucks, with a particular focus on small growers and exporters. A noticeable improvement was achieved in systems of agro-food products thanks to the proliferation of cold stores. However, this did not concern retail outlets where the problem of the cold chain is still lagging behind. Besides, food products for the local market face several constraints including storage and conservation that require investments. Some improvements have been made in this direction in the last few years but there is still a long way to go.

- The lack of a perishable terminal at Luxor Airport to serve Luxor, Quena, Sohag and Aswan and the need for a Phase II expansion of the Cairo Airport. The perishable terminals are crucial for the improvement of the exportation of horticultural fresh products in order to achieve the continuity of the cold chain.

- The lack of a treatment centre with irradiation chambers for herbs and spices for a "clean spice" program.
- The dispersion of the export promotion functions across several institutions and the lack of a focal point to coordinate promotional activities.
- The unavailability of adequate cargo space at reasonable rates. This situation is expected to worsen with the progressive fuel cost increase and the frequent financial problems in the country and all over the world.
- The lack of export awareness of the fast changing demanding requirements and standards of the EU market (European GAP, BRC, HACCP) and the need to provide an advisory service to small growers and exporters related to the latter.
- The lack of reliable market information and a data base on production, domestic consumption and export trends of horticultural crops.
- The lack of transport logistics for agriculture and the agro-food chain where losses related to transport and storage range from 25 to 50% of the harvest, despite the fact that the production and marketing chains for food exports have improved enormously over the last decade of the twentieth century. Food products for the local market suffer from several shortcomings, especially the lack of modern river transport taking advantage of the Nile and retail outlets to meet the required standards.

Constraints of the production and marketing chain

The imbalance between agricultural development efforts in production and marketing leads to weakness in the production and marketing chain. These links become complex in small farming operations. Special attention should be given to increase small farmers' net return from production through the establishment of producers and agro-processing associations. Conventional agricultural marketing systems are still dominated by traders and middlemen, thus resulting in high rates of pre- and post-harvest losses and spoilage.

The present agricultural marketing system can be described as conventional and has not yet enjoyed enough attention for its development and modernisation. Domestic markets face several problems and limitations that need to be addressed. Local markets pay limited attention to pre- and post-harvest practices. Moreover, local markets suffer from the dominance of conventional practices that fail to consider post-harvest and handling principles, inherited marketing systems, as well as the presence of numerous dealers and middlemen, Significant marketing services or added value benefits are inexistent. Besides, the local market has no access to marketing information systems that are essential for the benefit of the farmers. One of the major problems is the absence of quality standards and a food safety control system for the majority of agricultural products. The old cooperative system is poor and is diminishing the role of farmers' marketing associations. The local marketing infrastructure is poor in most of the wholesale and retail markets both in terms of physical and human resources. The government's regulating role in agricultural and food

markets is also too weak. For instance, there is no strong tool to assure the prevention of adulteration and monopolistic practices. The absence of an institution that is responsible for addressing marketing issues and capable of studying and analyzing marketing problems is another obstacle for the development and modernisation of local marketing systems.

The above-mentioned issues have led to negative results that represent chronic defects in the structure of the agricultural sector. The most important ones are the high percentages of losses and spoilage ranging from 10-15% of the total shortcoming in agricultural output, according to the estimates in recent years. The defective local market leads to a reduced producers' share in the value paid by consumers for their products, with traders and middlemen getting the greater share without any additions to the value chain. This unbalanced situation discourages the growers from improving their product quality. Moreover, it leads to the instability of agricultural products' markets that suffer from sharp shocks and imbalances. In turn, wrong production decisions are taken due to the effects of confused marketing conditions, incorrect market signals and decreased quality standards of a significant portion of agricultural products. The final outcome of this is the visible malfunction in local marketing practices.

Agricultural marketing and foreign trade developments

Agricultural marketing including marketing policies, facilities, services, institutions, systems and modalities started to enjoy appropriate attention from planners, policy makers and decision makers during the last decade of the twentieth century and the first decade of the new millennium. However, attention has been primarily given to large agricultural production and export oriented development projects, neglecting the primary and vital role of investments in improving small growers and local marketing systems.

Since the 1990s, the priority has been given to the modernisation and development of some of the marketing services of agricultural and food products. This includes:

- The development of export marketing systems leading to increased agricultural exports, the value of which has increased over the last few years to four times more than it was in the mid-1990s;
- The relative expansion in processing agricultural food products, especially vegetables, fruits, meat and milk. New modern technologies have also been introduced such as line production in the marketing chains;
- The establishment of new marketing channels coupled with greater attention to sorting, grading and packaging processes;
- The development of facilities and capacities in some marketing services, particularly those related to processing and exportation;
- The remarkable successes of non-governmental organisations for small and large agricultural in adopting modern techniques, as well as developed production and marketing practices leading to significant export developments.

Solving the fragmentation of land ownership by improving the irrigation systems

In the Nile Delta region, land ownership is quite small with an average of less than 5 *feddans* (acres). Meanwhile, due to the land fragmentation each farmer grows different crops. This makes it so difficult to improve crop rotation and to market the yields. The dominant irrigation system consists of the old surface irrigation and due to their modest farm income farmers cannot improve the irrigation system. Despite water scarcity and the predetermination of Egypt's share in the Nile waters, water-use efficiency is low due to high water losses. Water conveyance efficiency is estimated at 70% and the mean efficiency of field irrigation systems is estimated at only 50%. Hence, one of the main components of the agricultural development strategy is to achieve a gradual improvement of the efficiency of irrigation systems. The aim is to reach 80% in an area of 8 m *feddans* and to reduce the areas used for rice fields from 1.673 m *feddans* (2007) to 1.3 m *feddan* by 2030 in order to save an estimated 12.4 billion cubic meters of water. The improvement of on-farm irrigation systems will certainly help aggregate small farms into larger units that could be cultivated with better and increasing yielding crops thus improving product quality and cash return. This could be the first step to improve postharvest and marketing systems.

Policy outcomes

It is clear that any commitment taken to develop and improve the competitiveness of Egyptian agricultural products in local and international markets would require serious and sustained efforts both nationally and internationally, in the agricultural sector and with the involvement of all stakeholders.

An increased productivity

The introduction of new varieties, the expansion of protected agriculture, the modernised irrigation systems and improved fertiliser recommendations have led to significant increases in the productivity of many vegetable crops. Tomato yields rose from 7.4 tonne/*feddan* in 1980 to 16 tonne/*feddan* in 2007 i.e. an increase of 116%. Strawberry productivity increased from 1.5 tonne/*feddan* to around 11.6 tonne/*feddan*, i.e. an increase of 673%. Potato yields increased by 50% from 1980-2007, from 7.3 tonne/*feddan* to 10.7 tonne/*feddan* and cantaloupe productivity increased by 75% during the same period.

The development of fruit crops has been outstanding. Productivity has increased to unprecedented levels. The quality of several varieties has improved, such as the grape where seedless high-yielding varieties have been gradually introduced to replace seeded varieties. The new varieties include early- and late-maturing lines leading to an extension of the supply period. As a result of these efforts, grape productivity increased from 5.2 tonnes/*feddan* in 1980 to 9.9 tonnes/*feddan* in 2007. The banana crop has also achieved quantitative and qualitative improvements due to the introduction of drip irrigation and new varieties that helped double productivity between 1980 and 2007. As for olives, productivity achieved record gains reaching 475%

during the same period. Although productivity growth of the apple, pear, plume and peach varied, they have all increased by 100% during 1980-2007. The fact that thanks to the improvement agricultural practices and farm management, the present productivity is below the productive potential of existing varieties, and that there are great possibilities for its increase, at rates between 25-50% is quite noteworthy.

The role of small farmers in Egyptian exports

Farmers' associations and organisations play a fundamental role in agricultural systems all over the world. Due to the fragmentation of agricultural holdings, conventional applications in most of production activities and the challenges that faces the marketing of agricultural products, such farmers' associations and organisations should be established to help alleviate these problems. Even if their effects might only be marginal after the deterioration of the agricultural cooperatives, the loss of most of their roles and the farmers' loss of confidence in such cooperatives, these organisations should be developed. Therefore, reforming cooperatives and rebuilding farmers' confidence or encouraging farmers to establish voluntary associations are among the very serious challenges of the agricultural sector in the forthcoming period particularly for the proposed projects related to farm irrigation improvement. Unless a significant progress is achieved in carrying out this difficult task, it would be impossible to achieve development in several other fields, as farmers' associations constitute the basis through which many obstacles can be overcome and many goals can be achieved.

Box 2: Al-shams societies: an example of a successful civil society initiative promoting agricultural development

Established in 2002 in both Middle and Upper Egypt, Al-shams societies are one of the most recent civil society organisations that are active in agriculture, with the purpose of pooling small farmers' efforts on a voluntary basis. The project aimed at providing technical, administrative and marketing expertise in production, marketing and processing of non-traditional crops. Some 109 societies have so far been established according to the law regulating the establishment of non-governmental organisations. To ensure the success of these societies, the project focused on the support to institutional capacity through training; establishing links between societies and exporters of non-traditional crops; promoting women's participation in the activities undertaken by the societies and in their management; training members for the establishment of a technical framework capable of undertaking marketing activities and bargaining for getting better prices; and promoting the practice of contract farming between producers, exporters and agro-industries companies. Al-shams societies have been able to achieve unprecedented successes compared to other small farmers' associations. It has been originally planned that these societies would generate an income estimated at 120 million Egyptian pounds for their members over a period of four years. They have actually generated 160 million Egyptian pounds, an increase of 30%. The total value of exports amounted to 75 million Egyptian pounds. As a result of their activities in non-traditional crops, the demand of agricultural labour, especially coming from women, has increased. Furthermore, Al-shams societies have been able to establish more than 860 contracts with exporters and agro-industries companies. They have now approximately 12.5 thousand members compared to a targeted figure of 10 thousand members, i.e. an increase of 2.5 thousand members.

Future trends and possible improvement plans

The agricultural strategy has encouraged the government to strengthen competitiveness at national level through economic reforms and improvement of investment environment, financial and monetary macro-policies and external trade policies. However, greater efforts should be invested to reach new international markets. At the agricultural sector level, there are many elements and areas that require improvement. In this respect, the priorities are:

- Giving greater attention to the improvement of product traits in accordance with the requirements of domestic and foreign markets, as well as marketing and processing requirements;
- Establishing quality standards for agricultural products, and expanding sorting, grading and packaging processes in accordance with such standards;
- Keeping informed of modern and advanced techniques that support the economic efficiency of agricultural production, particularly those related to the development and use of high-yielding, early-maturing varieties and varieties that can endure unsuitable environmental conditions;
- Using modern information and communication techniques that serve the agricultural sector; developing needed marketing facilities and services and agricultural markets;
- Refining pre- and post-harvest practices to improve product quality;
- Applying modern techniques in monitoring, analysing and forecasting natural, technical and marketing risks under a special unit for the management of agricultural risks;
- Connecting farmers, particularly small farmers with markets, including the development of marketing systems and channels and providing them with marketing information and marketing extension;
- Activating and strengthening the role of the government in achieving the right equilibrium between this role and market forces, including exercising supervision on quality standards of both inputs and outputs, strengthening competitiveness, banning monopoly and adulteration, improving consumer protection, as well as supporting civil society organizations;
- Strengthening institutional and organisational mechanisms that support the links between local and external marketing, including contract marketing as well as establishing specific commodity boards and associations.
- Improving the transport and harbour infrastructure to absorb the possible increase in perishable commodities exports;
- Establishing an appropriate system for local food safety and market monitoring.

Conclusion

The logistics of food trade in Egypt have improved over the last two decades especially in terms of large farms and companies aiming at producing exportable commodities. The local farming systems as well as the local food marketing systems still need to be improved. The Egyptian Sustainable Agricultural Strategy Towards 2030 has paved the road for substantial improvement in these regards. Yet, the political instability and the security problems in the country fail to enable the progress of development for the time being.

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CHAPTER 22

TRADE, LOGISTICS AND AGRO-FOOD STRATEGIES IN PORTUGAL

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Portugal is a northern Mediterranean country that represents 2% of the population, surface area and gross domestic product of the European Union (EU) (GPP, 2013). Despite its small size (western flank of the Iberian Peninsula, archipelagos of Madeira and the Azores), it has a remarkable geographical diversity. In its continental part, the climatic contrasts are particularly marked. Along the central and northern coast, the Atlantic region is covered with rugged mountainous areas. Predominantly peneplain, the interior regions and the south of Portugal are of a Mediterranean nature (DGOTDU, 2007; Ribeiro, 2011). This diversity of climate and relief is reflected in the land occupation and the economy of the agro-food sector.

In the Portuguese economy, the agriculture and forestry sector accounted for 5.4% of GDP and 13.2% of the country's employment in 2011 (GPP, 2012a). Regarded as a strategic pillar of the economy, it strongly contributes to the country's rising productivity and competitiveness at macroeconomic level (GPP, 2010). The agro-food sector (comprising both primary agricultural production and the food and drinks industries) accounts for 4.1% of national economic value and 11.5% of employment. In the last decade, exports in the sector have increased more rapidly than in other sectors of the economy, contrasting with the trend in the period 1990-2000 (DPP, 2004).

In this chapter the trends of the Portuguese agro-food sector, beginning with an analysis of supply and international trade, public and private infrastructure and strategy and access to markets, will be presented. Some ideas will be suggested to analyse the country's position in international trade and the logistics developed in the Mediterranean (especially with Spain) and the trade with Angola and Brazil, two Portuguese-speaking countries with very close ties to Portugal.

Trends in Portuguese trade

The recent volatility in global agricultural markets has led many states to focus on food security issues. In this sense, the current Portuguese agriculture policy seeks to promote the growth of production to increase self-sufficiency in food products, which today has only been achieved for products like wine, vegetables, rice, eggs and milk (GPP, 2012a).

Agricultural production is mainly based on the vegetal component (84% against 16% for animal production), marked by the predominance of vegetables, fruits, wine, but also milk. Almost half of the output (49%) is destined for the agro-food industries (GPP, 2012a). The domestic market is still the main destination of the products of these industries, absorbing some 85% of their respective sales (INE, 2012b).

In the period 2008-2011, Portugal produced, on average, 74% of the domestic consumption of meat and is in deficit for all categories of meat products. Over the same period, its self-sufficiency in olive oil improved (from 62% to 77%). In 2010-2011, the production of cereals, apart from rice, covered only 19% of domestic consumption (human and animal), and fruit production was insufficient to meet domestic demand (64 %) (INE, 2012b).

Although self-sufficiency in food products is confined to certain products, the reality of this sectoral dependence changes when viewed in terms of value. Calculated on the basis of the ratio of production values and the difference between production and the foreign trade balance, the rate of self-sufficiency is 80% (Avillez, 2012). Domestic production and exports are thus sufficient to offset imports in monetary terms. This indicator also shows the trend in terms of agro-food exports, which contribute to the growth in value of national production. It also underlines the strong internationalisation of the agro-food sector.

Although the trade coverage rate (ratio of imports and exports) in the agro-food sector continues to show a deficit, exports reveal a remarkable dynamism. Between 2000 and 2008, exports in the agricultural and agro-food sector increased annually by an average of 12.8% and 9.5% respectively. However, during the last three years, there has been a slowdown, due to the national and European economic crisis. The trade deficit in agriculture increased by 10% while the deficit ration of the agro-food industry improved by about 20% (GPP, 2010).

Geographically, the international trade of the agro-food sector concerns mainly the EU countries, with the share of imports (78%) being higher than exports (71%). This ratio of imports over exports is also visible in Mediterranean countries due to the trade with the southern EU countries, especially Spain. Spain is also Portugal's main trading partner, its leading customer (45%) and its leading supplier (33%). The principal food products exported to the Iberian neighbour are fish and crustaceans (13.3%), milk and other dairy products (6.6%), sugar and confectionery (5.4%), these being the only products where the trade balance with Spain is favourable (GPP, 2012a).

With regards to foreign trade outside the EU, Portugal's exports (29%) exceed imports (22%). In this context, two aspects should be noted. On the one hand, the level of trade with southern Mediterranean countries is low. It is limited to Algeria and Morocco, to which Portugal mainly exports processed vegetables and dairy products while importing sugar and confectionery. On the other hand, trade exchanges with Angola (12% of Portuguese agro-food exports) and Brazil (5% of agro-food imports and exports) are quite significant. Between 2009 and 2011, the exports of agricultural products to these countries increased by an average of 31% for Angola and 35% for Brazil. Thus, in 2011, Angola became the third destination of Portuguese agro-food exports. This trend highlights the potential for growth in the trade of agro-food products with these countries (INE, 2012b).

With regards to the intensity of specialisation of Portuguese agro-food exports (see Table 1), the revealed comparative advantage (RCA) compared with the world and the EU 27 should be highlighted. It is 1.5 times higher for drinks and processed products (meats, sugar and confectionery, fruit and vegetables). Compared to other Mediterranean countries, there is a relative specialisation in processed products (sugar and confectionery and meat products).

Infrastructure and logistics

The modernisation of Portuguese infrastructure began thanks to the Community funds following the country's accession to the EU in 1986. A major development of the road network, the main element for the structuring of the country's infrastructure, contributed to a significant improvement of international, interregional and intercity accessibility (DGOTDU, 2007). Portugal now has one the most developed road networks in Europe. This infrastructure links the major urban centres and the principal ports and airports.

Domestic goods traffic is particularly favoured by motorways, which provide for 90% of the total goods transported (INE, 2011). The share of food and drinks ranks second in the total volume of goods conveyed at national level (INE, 2012b). More than half of cereals production is transported across the country via the road network. Nevertheless, barriers to road transport are increasing, especially if road haulage costs and the associated environmental factors are included. These pressures provide various opportunities to rail and maritime transport, which are at present still under-utilized and insufficiently profitable. However, road transport is still dominant in the agro-food sector at international level, accounting for over half of international trade in foodstuffs and drinks (INE, 2012b), even though maritime transport continues to occupy a dominant position in trade almost everywhere in the world, especially in Portugal (61% in 2011).

The geographical coverage of the national rail network illustrates the process of coastal development, with a concentration of infrastructure along the Portuguese coasts, especially in the metropolitan zones of Lisbon and Porto, and the logistical links with the main ports. The national rail network is almost exclusively devoted to freight and includes a few logistics activities with some operators (maritime or land routes). However, from the point of view of both public authorities and private

operators, the quality of the infrastructure and national links with trans-European networks must be improved, especially in the multimodal transport corridors (MOPTC, 2009). Agro-food products account for only 5% of the volume of goods transported by rail in the country and the volume carried by international rail networks remains residual (INE, 2012a).

The economic activity of the Portugal's nine ports including Sines, Leixões and Lisbon (MEE, 2011) focuses primarily on the transport of goods. The small size of the terminals in some ports does not enable them to attract the major shipping lines. Like in the majority of Mediterranean ports, this leads to a slow movement of goods (Abis, 2012). This imposes an additional cost of transport to the multimodal transport hubs of southern Spain or northern Europe. International shipping has gained in importance for Portuguese exports in recent years.

Between 2007 and 2011, the share of maritime transport in Portugal rose from 42% to 54% in volume and from 27% to 35% in value, to the detriment of road transport (INE, 2012a). Together with the port of Tarragon, the port of Lisbon is the leader in the Iberian Peninsula in the agro-food sector's bulk trade. However, the overall potential capacity of Portuguese terminals is still far from being optimal, in particular for the port of Lisbon where the annual traffic of 12 million tonnes of goods could potentially be increased by four or five times, and thus provide greater capacity for transhipment (Consulmar *et al.*, 2005). The favourable position of the port of Lisbon thus offers new prospects, in particular, by attracting the transhipment of bulk cargoes especially soya (bio fuel) and its derivatives, transatlantic trade from South and North America (especially Brazil) to the European market and by integrating sea highways to stimulate short sea shipping.

In addition to the development of the country's infrastructure, the accelerating outsourcing of the Portuguese economy in the last twenty-five years has led to a general restructuring of the services sector including logistics services (CGD, 2012). Measured thanks to logistics performance indicators, their quality places Portugal in the fourth place among Mediterranean countries (World Bank, 2013). The main logistics operators have created logistics centres and a few carriers have developed their own platforms linking port activities and road transport. However, there is a clear difference between logistical subsystems, which support consumption, and those related to production. With regard to consumption, the country is quite highly developed, with distribution bases able to cover the entire country and equipped with modern information and management systems (e.g., company distribution platforms). On the other hand, the production support subsystem has relatively inefficient structures, which prevent the network from functioning properly, with damaging consequences for its growth and competitiveness (MOPTC, 2009).

Related to the geographical diversity (time zone, climate and demographics) mentioned here above, the strong regional contrasts in the agro-food and logistics sectors need to be highlighted (see Map 1). Although, in the intra-regional context, the economic weight of the sector is relatively homogeneous (between 8 and 11%), there is a certain disparity at interregional level. In fact, the economic value generated by

agro-food and logistics enterprises are concentrated in the Greater Metropolitan Area of Lisbon, with over 50% and the coastal North with over 75%.

Private and public strategies

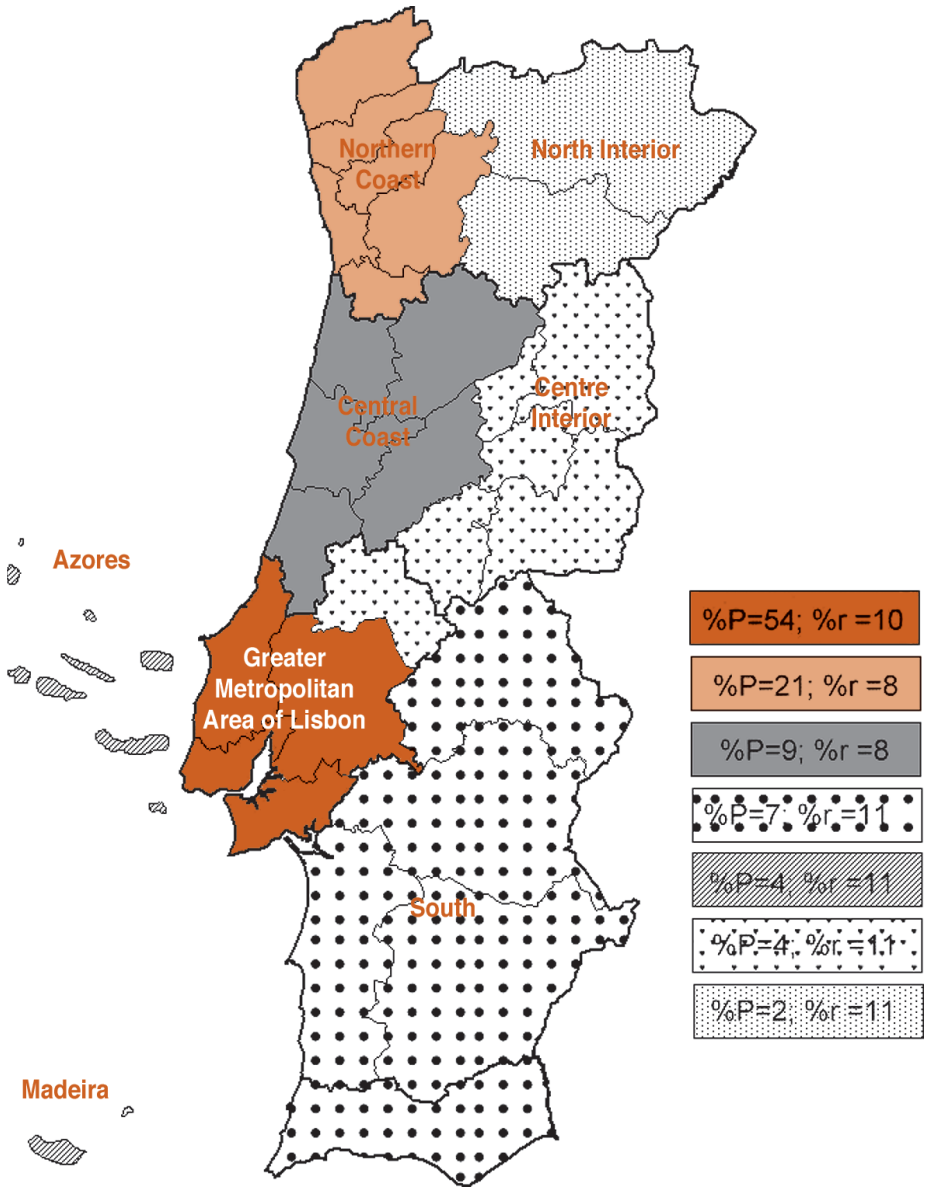
The case of Portuguese fruit and vegetable marketing companies illustrates the strategies pursued by private operators in supplying the European market. The dynamism of these companies comes from their capacity to meet the growing demands of European large-scale distribution with which they have concluded supply contracts.

A typical example is that of the Rocha pear, particularly appreciated by European consumers and one of the main agricultural products of western Portugal (especially in the Greater Metropolitan Area of Lisbon, see Map 1). The fruit has a protected designation of origin (PDO), *Pera Rocha do Oeste*, and constitutes a considerable part of the value of agricultural exports (11% of agricultural products and some 2% of the entire agro-food sector) (GPP, 2010). The economic operators involved have developed a strategy of differentiation and positioning in the international market based on quality (in over twenty countries, notably Brazil, France and the United Kingdom) (GPP, 2012). The modes of trade used are road and maritime transport including in cold supply chain. While, in the past, shipments to Brazil passed through the Spanish ports of Valencia and Algeciras, the 40% increase in export volumes between 2008 and 2011 (GPP, 2012b) encouraged the development of shipping via the ports of Lisbon and Leixões.

Portuguese public policies increasingly include the country's geo-strategic situation in the context of transatlantic relations between the EU, Latin America and Africa. The authorities have therefore supported investment in logistics infrastructure and, as in Spain, Italy, France and Germany, encouraged the development of networks of logistics platforms to enhance the efficiency of flows and the provision of high value added services (MOPTC, 2008). A national plan for logistics launched in the last decade, envisages national public and private investments with an emphasis on intermodal and integrated solutions. These investments are primarily intended to encourage the development of railways to ensure their integration in the European network and, above all, to make communications between the Iberian Peninsula and the rest of Europe more effective. This plan concerns both road and rail infrastructure and the installation of large logistics platforms in Portugal.

In 2007, in the framework of the *Plano Potugal Logístico*, a national network of logistics platforms was established, consisting of eight platforms, half of them located in the main ports and the others located along borders and close to major transport axes. Two airfreight centres in Porto and Lisbon complete this plan (MOPTC, 2008). Six years after the introduction of this strategic plan, the two poles of Leixões that of Aveiro and the one in Lisbon, as well as one of the poles envisaged for the port of Sines are already operating. Despite the adverse economic situation, this strategic project has been maintained.

Map 1 - The economic importance of the Portuguese complex of agricultural enterprises, fishing, food industries and logistics (triennial average 2008-2010)



Key: %P = regional distribution = relative weight in the Portuguese total; %r =% of GVA of the complex in total GVA of enterprises in the region.

The Gross Value Added (gross value of production minus the costs of raw materials and other products used in the production process) of the complex of agricultural enterprises, food industries and logistics corresponds to the sum of the GVA of the enterprises (Classification of Economic Activities [CAE] Revision 3): "agriculture, livestock farming, hunting and fishing", "food industries", "wine industry", wholesale trade, excluding tobacco and retail, of agricultural and food products", "transport of goods", "storage", "management of land transport infrastructure", "other auxiliary land transport activities", "freight handling" and "activities of shipping agents, customs agents and other transport support activities". The regions identified are the result of the aggregation of NUT III (Nomenclature of Territorial Units for Statistics, level 3).

Source: www.ine.pt; the authors are grateful to Vitor Martins for the production of the map.

In the field of maritime transport, the public authorities have recently put forward measures to develop short sea shipping. Some port authorities have also responded to calls for tenders launched in the framework of the European Marco Polo I and II programmes, for the development of intermodal systems. In 2004, Portugal set up a project called the PORTMOS project involving the ports of Sines and Leixões, which was approved by the European Commission and considered as a reference project. In 2009, the port authorities of Aveiro and Douro-Leixões created a consortium with the Spanish company Zaldesa (the Salamanca Logistics Activity Zone) with to the aim of participating in the Marco Polo II programme. The objective was both to promote intermodal freight management based on three modes of transport (rail, road and maritime) and to analyse the feasibility and operational efficiency of short sea shipping between northern Portuguese and northern European ports.

Some port facilities in operation, such as the ports of Aveiro and Sines, have been strengthened, particularly because of the impetus provided by the trade with Spain. With regards to the port of Sines in particular, the construction of Terminal 21 has allowed a significant increase in the capacity of container transhipment for the Atlantic and Mediterranean routes. This activity has also intensified for goods destined for the Community of Madrid and the East of Spain. The new accessibility of the north rail terminal in the port of Aveiro (2010) has helped to stimulate trade in raw materials and transformed products, especially with Spain, Salamanca and the conurbation of Madrid in particular.

Portugal: the advantage of geography and history

Although the agro-food sector occupies a significant place in the Portuguese economy, it reveals a certain openness to the outside world with significant comparative advantages over its main trading partners, especially Spain (see Table 1) (GPP, 2012b). This trade intensity is primarily due to the recent development of infrastructure and logistics and the implementation of public and private strategies to encourage the modernization of logistics chains.

How should for the future role of Portugal in trade between the north and the south of the Mediterranean and between the American and African continents be considered? Although it is situated on the fringes of Europe, the country enjoys a geographical position that specifically benefits the circulation of information, services and goods (Leite, 2010; DGOTDU, 2007). Its position at the West of Europe places Portugal in a special position at the crossroads of the Atlantic Ocean and the Mediterranean routes (Almedia, 2010), and thus within reach of the main ports of the Atlantic, the Persian Gulf and the Far East. The importance of the maritime coast and the existence of deep water ports, especially those of Sines and Leixões, offer favourable conditions to allow Portugal to become, in time, an inevitable entry port to Europe for products from these geographical areas (Cushman & Wakefield, 2011).

Table 1 - Revealed Comparative Advantage (RCA) of the Portuguese agro-food sector*

	1 to 1.5	1.5 to 2	Over 2
Agro-food sector (1-15)	World, EU-27	–	Angola, Brazil
1. Live animals	–	–	Angola, Brazil
2. Meat and edible offal	–	–	Angola
3. Fish and crustaceans, molluscs and other aquatic invertebrates	–	World, Spain	EU-27, Med. Basin, Brazil
4. Milk and dairy products, eggs, natural honey	World	–	Spain, Angola, Brazil
5. Other products of animal origin	–	World, EU-27	Med. Basin, Spain
6. Living plants and flowers	Med. Basin	Spain	Angola, Brazil
7. Edible vegetables, plants, roots and tubers (1)	–	–	Angola, Brazil
8. Edible fruit, peel of citrus fruit or melons (2)	–	–	Angola
11. Flour products, malt, starches, inulin	–	–	Angola, Brazil
12. Oleaginous grains and fruits, grains, seed, other fruit, straw...	–	–	Angola
13. Gum, resins and other sugars and plant extracts	–	–	Angola, Brazil
14. Materials for plaiting and other products of vegetable origin	Med. Basin	EU-27, Spain	Brazil
15. Animal/vegetable fats and oils, products of separation	World, Med. Basin	EU-27	Angola, Brazil
Food (16-23)	EU-27, Med. Basin	World, Spain	Angola, Brazil
16. Preparation of meats, fish, crustaceans, molluscs	–	World, EU-27, Spain	Med. Basin, Brazil
17. Sugar and confectionery	World	EU-27, Med. Basin	Spain, Angola, Brazil
19. Preparations based on cereals, flours, starches, milk, pastry	World	Spain	Angola, Brazil
20. Preparations of vegetables, fruit or other parts of plants, (3)	EU-27, Med. Basin, Spain	World	Angola, Brazil
21. Various food preparations	–	–	Angola, Brazil
22. Drinks, alcoholic liquids and vinegars	Spain	EU-27	World, Spain, Angola, Brazil

* RCA of Portugal = Portuguese exports (%)/exports of the region (World, EU-27, Mediterranean Basin, Spain, Angola, Brazil (%); average 2008-2011.
(1) Importance of the heading "Fresh or frozen tomatoes".
(2) Importance of the heading "Fresh apples, pears and quinces".
(3) Importance of the heading "Processed tomatoes/conserves other than in vinegar or acetic acid".

Source: International Trade Centre, *Trade statistics for international business development* (www.trademap.org/Country_SelProductCountry_TS.aspx) (consulted on 18 December 2012).

In addition to this special geographical position, the weight of the country's trading history should also be highlighted. The trade with the Portuguese-speaking countries, especially Brazil and Angola, is particularly revealing in this regard. These are rapidly expanding markets, in which Portugal offers significant comparative advantages (see Table 1) especially in the trade of olive oil, wine and fish. The importation of cereals and oleaginous plants, as well as sugar and fruit from Brazil is noteworthy. The most representative imports from Angola are fish and coffee. The relationship established by this trade is regarded as a means of stimulating national maritime transport by the Portuguese public authorities (Cushman & Wakefield, 2011). It is clear that Portugal's position offers very favourable shipping conditions that can compete with other modes of transport. These considerations further underline the strategic nature of the ports for Portugal's economy and, ultimately, the establishment of an Iberian hinterland.

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CHAPTER 23

PRIVATE FOOD SAFETY AND QUALITY STANDARDS IN INTERNATIONAL TRADE

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Trade liberalisation is a factor that induced a change in policy and development strategy, the substitution of imports by export in the Mediterranean and elsewhere. This transition has led to the involvement of a large number of producers in export activities and in global or regional supply chains. Many food supply chains span across countries or regions and involve a variety of different operators. Ensuring food safety and production quality, processing and trading practices all along these global chains is a real challenge. This is why, food and safety standards have proliferated in the past decades and are increasingly used to govern food safety and quality issues related to agro-food value chains.[1] Compliance with food standards can be quite challenging for a producer or exporter. In addition, the need for the supply of large volumes while maintaining the same quality and food safety standards often requires costly investments. This is due to the demanding requirements set by food standards. This chapter will also address issues of food safety and quality in the Mediterranean agricultural sector.

The role of food quality and safety standards in international trade

Private food and safety standards have increased in recent decades and are increasingly used in food safety and quality issues in agro-food value chains in the Mediterranean and elsewhere. This is due to several reasons. Agro-food value chains have become more complex and fragmented than in the past and more difficult to manage. Food safety scandals have increased awareness among consumers thus leading to increased competitive positioning based on food quality and designation of origin. Finally, the responsibility for food safety has become de facto a responsibility in many markets.

1 - For more detailed information on the standards mentioned in this paper, visit the Standards Map website (www.standardsmap.org).

The harmonisation of standards is an important objective for several reasons. Countries that comply with international standards referenced in the SPS Agreement (Commission of the codex Alimentarius [CAC], *Office International des Epizooties* [OIE] and the International Plant Protection Convention [IPPC], are automatically considered to be in compliance with the SPS Agreement. In other words, if the WTO members comply with these standards and their respective guidelines, the application of the SPS Agreement is facilitated. For exporters, this represents a big leap in terms of access to market.

Given the potential for increased efficiency in international trade and positive impact on welfare, governments are working towards a multilateral coordination of food safety regulations. An important step towards more harmonised public food regulations has been taken by different countries. The adoption of the Sanitary and Phytosanitary Agreement (SPS) related to Technical Barriers to Trade (TBT) by the WTO has been an important step towards the harmonisation of food regulations.

These agreements establish rules on the application of standards by member countries and aim to minimise the trade distorting effects of food standards. They also oblige the countries to consider the impacts of the regulations adopted on trade since they have formally agreed to do so. The SPS Agreement also defines procedures for the resolution of disputes related to the establishment of food standards (Caswell and Henson, 1999). The new standards or technical regulations defined by the WTO members must be notified prior to their implementation in accordance with the terms of the SPS and TBT Agreements.

Another important step towards the harmonisation of global food standards has been taken with the development of the Codex Alimentarius as it sets a benchmark for international food quality and safety standards. It is also used by the WTO as a guideline to evaluate national standards and their possible impact on trade restrictions. Additionally, the United Nations Economic Commission for Europe (UNECE) has developed a set of standards used as a basis for quality standards and grades. The Organisation for Economic Co-operation and Development (OECD) provides international standards for seeds, forestry reproduction material and fruits and vegetables.

Although the harmonisation of public standards has advanced considerably in the past decade, national governments continue to implement measures that are not always aligned with international standards as evidenced by the amount of notifications that WTO members must provide in such cases (WTO, 2011).

The harmonisation of standards is all the more important, as the profits it can induce are immense. It is estimated that about one third of the world traded goods are affected by private standards and that the impetus to trade through a total international harmonisation of product standards would lead to the reduction of tariffs (Büthe and Walter, 2011). The harmonisation of public standards make trade more efficient; exporters would be able to comply with internationally accepted standards instead of complying with different standards for each target market. Hence, export opportunities would grow and the consumers would also have a wider range of –

probably cheaper – products and services to choose from. Standards that have been subject of an international agreement lead to an increase in trade and exports.

Box 1: Euro-Mediterranean bilateral agreements and convergence with EU standards

The regulatory convergence of Mediterranean Partner Countries (MPCs) with the Community's acquis becomes an important issue in regards to agricultural negotiations of Euro-Mediterranean bilateral agreements. This is also an area for cooperation in the framework of the European Union's (EU) new European Neighbourhood Policy (ENP) that was revised in 2011 following the revolts in some Arab countries of the Mediterranean region[2]. In view of the establishment of a Euro-Mediterranean free trade area, the ambition of the EU is to create the medium term conditions for the application of common standards that are favourable to health security and fair competition between producers of MPCs and the European Union.

The negotiations underway for the reciprocal liberalisation of trade are undergoing major changes. In 2011, the European Council has authorised the European Commission to open negotiations for deep and comprehensive free-trade bilateral agreements. Compared with the bilateral agreements currently in force, the "perimeter" of the negotiations is expanded. In addition to the negotiations on tariff dismantling, new issues are being discussed, namely, trade facilitation, non-tariff barriers, intellectual property rights (Geographical Indications for example), sanitary and phytosanitary standards and investment protection. These new directions show the willingness of the EU to go beyond the merely commercial perspective that has so far dominated Euro-Mediterranean relations.

In the framework of the bilateral neighbourhood action plans[3], the ENP is simultaneously implementing schemes (institutional and financial) to support internal reforms in MPCs. On the one hand, these reforms are necessary to allow these countries to limit the negative effects of a greater openness of their markets and on the other hand, to enable them to take full advantage of the improved access to the European market. The MPCs' approximation of laws on standards with EU rules especially in the sanitary and phytosanitary fields is one of the cooperation axes of the ENP's new approach. As for agriculture, the European Commission has mobilised additional funds dedicated to a European Neighbourhood Programme for Agriculture and Rural Development (ENPARD programme). Food security and quality standards are included among this programme's areas of cooperation. This initiative essentially aims to cooperate and support the necessary reforms to upgrade agriculture in southern countries[4]. The objective is to strengthen the institutional and operational capacity of institutions and private actors to align the MPCs legislations with European standards and the effective enforcement of these regulations.

2 - European Commission, *A New Response to a Changing Neighbourhood: A Review of the European Neighbourhood Policy. Joint Communication by the High Representative of the Union for Foreign Affairs and Security Policy and the European Commission*, Brussels, European Commission, 2011 (http://ec.europa.eu/world/enp/pdf/com_11_303_en.pdf).

3 - Established on the basis of major strategic directions outlined by the Country Strategy Papers the action plan provides a timetable for reforms and actions in the short and medium terms (3-5 years).

4 - Dacian Cioloş European Commissioner for Agriculture Founding Speech: "Agriculture at the Heart of the European Neighbourhood Policy", 31/05/2012 (http://europa.eu/rapid/press-release_SPEECH-12-405_fr.htm?locale=EN); European Commission, ENPARD Conference on Strategic Modernisation of Agriculture in EU Neighbourhood Countries, press release, Brussels, Uropean Commission, 03/05/2012 (http://ec.europa.eu/agriculture/events/enpard-workshop-2012_en.htm).

The MPCs are not all involved in this convergence process in the same way. Benefiting from the "advanced status" granted by the EU in 2008, Morocco is the most advanced country. Since the beginning of 2003, negotiations are underway for the conclusion of a Deep and Comprehensive Free Trade Agreement (DCFTA). It is therefore very important for this country to engage in the process of convergence of sanitary and phytosanitary standards. Since 2010, the EU has engaged the "Succeeding the Advanced Status"[5] programme with Morocco. The strengthening of the convergence process of sanitary and phytosanitary regulations is one of the ten priority areas of this programme. The national legal and regulatory framework related to sanitary and phytosanitary matters is being upgraded in view of its approximation with EU standards. The actions implemented aim at strengthening the role of government agencies such as the National Committee for Sanitary and Phytosanitary Measures (CNMSP)[6] and the National Office for Food Safety (ONSSA)[7] that were established in 2009 (Law n° 25-08). The instruments mobilised are largely based on the agricultural pre-accession instrument (SAPARD – Special Accession Programme for Agriculture and Rural Development) established for central and eastern European countries in the framework of the EU enlargement policy. We can mention for example the Twinning programmes between public institutions and technical assistance institutions (TAIEX)[8] that provide for the exchange of expertise, for the upgrade of food law and the support for compliance with the obligations of the WTO (World Trade Organization) agreement on Sanitary and Phytosanitary Measures (SPS).

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Description of the key food safety and quality standards

A multitude of food safety and quality standards, codes of good practice and guidance documents have been developed in the last ten to fifteen years in response to specific needs of certain industries including fisheries and aquaculture, agricultural commodities, livestock as well as food processing. Some of these private standards were developed by non-governmental organisations and are based on international standards and frameworks such as the Codex Alimentarius and the internationally recognized Hazard Analysis and Critical Control Point (HACCP) approach or on the ISO standards. Other private standards were developed directly by industry associations to monitor more closely the issues of food safety and quality in their supply chain. While most of these initiatives are international, they have a strong impact on the Mediterranean and its regional and global agricultural trade.

5 - This multisectoral program with a budget of 180 million euros, aims to support the implementation of key reforms included in the "advanced status" roadmap and Action Plan (2013-2017) of Morocco. Support for regulatory convergence with the EU is one of the axes of this cooperation program.

6 - Comité National des Mesures sanitaires et phytosanitaires (tranlator's note).

7 - Office national de la sécurité sanitaire des aliments (tranlator's note).

8 - TAIEX is an instrument for technical assistance and exchange of information established in 2006 in the framework of the ENP. It is used to strengthen political and economic cooperation with several regions, mainly in the field of harmonisation and implementation of Community law.

Introduction to the main food safety and quality standards

The influence of food safety and quality standards is measured by the number of food enterprises that know and apply them. The main standards include the Food Safety System Certification 22000 (FSSC 22000), the Safe Quality Food Code (SQF), the British Retail Consortium Global Standards for Food (BRC), the International Featured Standards for Food (IFS), GlobalG.A.P. PrimusGFS, the Global Aquaculture Alliance Best Aquaculture Practices (BAP), the Aquaculture Stewardship Council (ASC), the Global Red Meat Standard (GRMS) and the CanadaGAP™. These standards can be grouped into different categories depending on their scope of requirements, sector coverage, regional application, and their possible recognition by other initiatives as being "equivalent" or similar in scope and outreach. Such recognition programs – also called benchmarking programs – aim to harmonise the standards' requirements and facilitate inter-operability between their audit processes and implementation methods.

The Global Food Safety Initiative (GFSI) is an example of a recognition and benchmarking programme initiated by food safety experts working for retailing, manufacturing and food service companies, as well as service providers associated with the food supply chain. GFSI aims to build a global approach to food safety issues by benchmarking and recognising food safety standards.

Mission, objectives and implementation of the main food safety standards

The *Food Safety System Certification 22000 (FSSC 22000)* is an ISO-based certification scheme for food safety management systems in the whole supply chain. FSSC 22000 uses the existing standards ISO 22000, ISO 22003 and technical specifications for sector prerequisite programs. The ISO 22000 international standard specifies the requirements for a food safety management system that involves the following elements: interactive communication, system management, prerequisite programs and HACCP principles. The FSSC 22000 certification scheme is accredited according to the ISO guide 17021 and recognised by the GFSI.

The *SQF Code (SQF)* is a food safety and quality management certification standard that utilizes the United States National Advisory Committee on Microbiological Criteria for Food (NACMCF) and the FAO CODEX Alimentarius and HACCP guidelines. The SQF Code has been redesigned for use by all sectors of the food industry from primary production to transport and distribution.

The *British Retail Council Global Standards for Food (BRC)* covers aspects of safety and quality management in the packing and processing of food products. This BRC was one of the first schemes references by the GFSI and is used around the world with certificates in over 100 countries.

The *International Featured Standards for Food (IFS)* are used to audit food safety and quality of processes and products of food manufacturers. IFS operates through five regional offices worldwide that coordinate technical working groups in different languages (German, French, American, Spanish and Italian) with different stakeholders, retailers, industry representatives, certification bodies and food services.

The *GlobalG.A.P.* referencing system is used for the certification of production processes of agricultural and aquaculture products. The GlobalG.A.P. standards are "pre-farm-gate" standards. They cover the entire agricultural production process with the exception of processing, manufacturing or slaughtering, except for the first level of product handling in aquaculture. Only products listed by the GlobalG.A.P Product List, published on the GlobalG.A.P website can be certified. Wild-catch and wild-harvest are not covered by GlobalG.A.P. standards.

PrimusGFS is a private scheme that establishes food safety requirements for the certification of fresh or barely-processed agricultural products intended for human consumption – from growing operations to barely-processed (fresh-cut) products. It defines a series of requirements for management of the production, handling, processing and storing operations to ensure product safety at each stage of production. The standard has defined three key areas that any company in the agricultural sector must consider at the time of production or manufacture of its products: Food Safety Management System, Good Agricultural and/or Manufacturing Practices and the HACCP System. PrimusGFS is recognised by GFSI.

The *Global Aquaculture Alliance Best Aquaculture Practices (BAP)* standards address community and employee relations, conservation of biodiversity, soil and water management and management of chemical products. Applicants are requested to carry out a self-assessment against the BAP standards to determine whether they are ready for external evaluation. The Global Aquaculture Alliance expects its members to strive for the benefit of the life and prosperity of local communities through the diversification of the local economy, the promotion of employment and contributions to the tax revenues.

The *Aquaculture Stewardship Council* is responsible for working with independent, third party entities to certify farms that comply with the standards that were developed through the Aquaculture Dialogues, eight roundtables initiated by the World Wildlife Fund (WWF) and launched in 2004. These Dialogues gathered aquaculture producers, conservationists, industrial processors, retailers, scientists and others who have set standards aiming to minimise the negative environmental and social impacts related to twelve aquaculture species: salmon, shrimp, tilapia, trout, pangasius, seriola, cobia, abalone, mussels, clams, oysters and scallops.

The *Global Red Meat Standard* (GRMS) is a scheme specifically developed for the red meat industry: it sets out the requirements for all production processes related to meat and meat products and focuses especially on the aspects on which the required levels of safety and quality depend. GRMS is recognised by GFSI.

CanadaGAP™ is a food safety certification program for companies that produce, pack and store fresh fruits and vegetables. Launched by the Canadian Horticultural Council, this certification program now comprises two manuals, one for greenhouse production, the second for other methods of fruit and vegetable production. It is based on a rigorous analysis of risks that apply the seven principles of HACCP. CanadaGAP™ has also been evaluated in terms of the GFSI Guidance Document, but not under the GlobalG.A.P. standards.

The *Codex Alimentarius* is a collection of internationally adopted food standards presented in a uniform manner: the standards include provisions of an advisory nature in the form of codes of practice, guidelines and other recommended measures to achieve the purposes of the Codex Alimentarius, i.e. to protect the health of consumers and to ensure fair practices in food trade. According to the FAO/WHO Codex Alimentarius Commission, these standards and codes of practice provide useful checklists of requirements for national food control or enforcement authorities and promote the elaboration and establishment of definitions and requirements for safe food production, to assist in their harmonisation and hence, to facilitate international trade.

Description of harmonisation efforts

The harmonisation of food safety and quality standards is more advanced than the harmonisation of social and environmental standards. While some claim that food safety standards establish another layer of governance and undermine harmonisation, some coalitions and internationally recognised standards such as ISO 22000 promote the process of harmonisation and equivalence (FAO and WTO, 2010). Examples include the BRC Global Standard for Food Safety in the U.K or the GFSI at the global level. The objective of the GFSI is to foster the convergence between different food safety standards through a continuous benchmarking process for food safety management schemes. In February 2013, the GFSI benchmarked six schemes, including the BRC Global standards, the International Featured Standard (IFS), Safe Quality Food standards (SQF), Canada G.A.P., Food Safety System Certification 22000 (FSSC 22000), and the Global Red Meat Standard (GRMS). This means that these standards are now considered as equivalent and suppliers need to comply with only one of these standards. Four additional standards are currently under review (FAO and WTO, 2010).

Harmonisation through benchmarking and mutual recognition of standards is an important strategy and an effective way to fight the potential barriers to trade. Such harmonisation of standards could be the subject of intergovernmental treaties but is seems more realistic and efficient that coalitions of firms and consortia of companies take the lead. Harmonisation is also supported by the development of "meta systems" such as the HACCP (Hazard Analysis Critical Control Point), Good Manufacturing Practices (GMP), Good Agricultural Practices (GAP) and traceability systems. Compliance with these systems is a prerequisite in the global trade of agricultural food (Henson and Reardon, 2005). Several standards incorporate these "meta systems", such as the food safety management system ISO 22000 and ISO 9000 developed by the International Organization for Standardisation (ISO), the SQF standard or Tesco Nature's Choice, which have been developed by individual firms (Jaffee *et al.*, 2011).

Comparison and analysis of some private food safety and quality standards

The analysis presented in this chapter is based on the ITC Benchmarking Tool, a recently developed MS Excel tool that extracts data sheets from the ITC Standards Map database on voluntary standards. This diagnostic tool allows for the

identification of levels of equivalence and difference between standards and comparison based on a set of 700 variables covering socio-economic, environmental, ethical and traceability issues as well as food quality and safety concerns. Currently, the ITC Benchmarking Tool is used to analyse five food safety and quality standards, namely PrimusGFS, FSSC 22000, IFS, SQF, and GlobalG.A.P. This analysis focuses on food quality and safety concerns, whereby the benchmarking tool distinguishes between the quality management system and the food management system in different standards.

Quality Management Systems

The quality management system is composed of different elements including company quality policy, technical quality requirements, product safety (excluding food safety), packaging and transportation requirements, availability of quality manuals, documentation and control processes, defined objectives, performance indicators, periodic review system, audit system, documented corrective actions and a purchasing and supplier approval system, with a total of thirteen criteria.

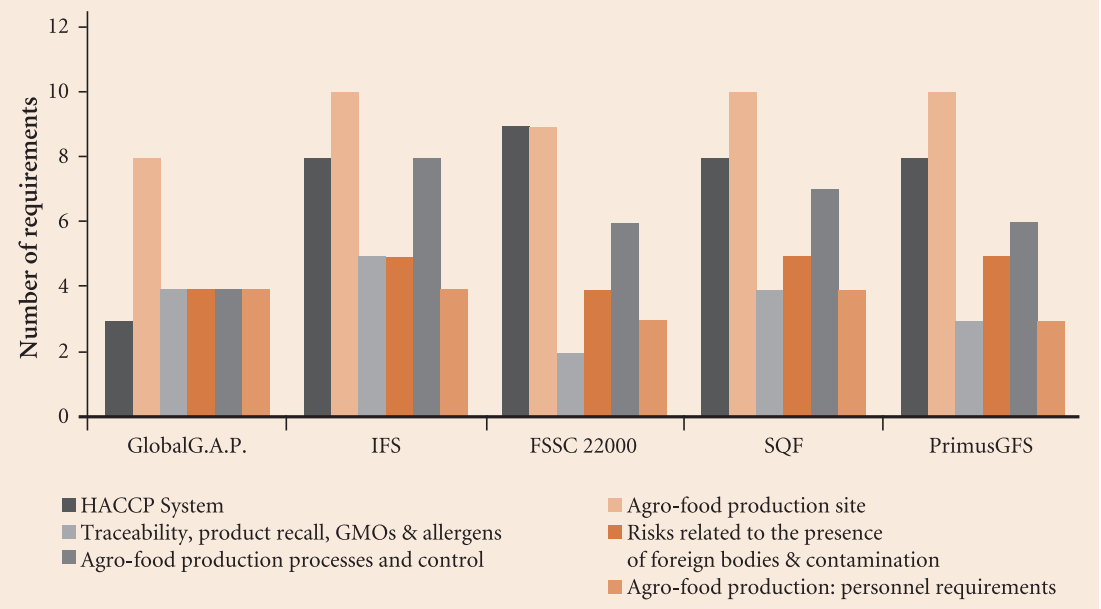
The comparison of the five standards among these components allows one to draw a differentiated picture of each standard. Our analysis shows a significant overlap between the five standards on QMS criteria. The five standards require the implementation of policies for handling and packaging of products, record keeping systems, processing of claims, periodic reviews of the QMS (quality management system), internal audit systems, monitoring and incident management and documentation of corrective actions which are all prerequisites for compliance with these five standards. However, some criteria are not required by all standards, e.g. quality policy statements (not covered by PrimusGFS, FSSC 22000), product safety excluding food safety (not covered by IFS, SQF, GlobalG.A.P.) or purchasing and supplier approval systems (not required by GlobalG.A.P.).

Food Management System

The ITC Benchmarking Tool defines the food production system as a set of seven core elements that will be discussed in further detail below, with the HACCP system as the core element. These elements correspond to 41 criteria, such as conditions on the production site, the traceability system, handling of food contamination risks, product analysis and testing, management of tests on non-compliant products and product transportation procedures.

HACCP systems. The HACCP (Hazard Analysis and Critical Control Point) system is a food safety management system that addresses physical, chemical, and biological hazards related to food products. The HACCP system allows operators involved in food supply chains to implement preventive control mechanisms at food production and processing levels. It makes it easier to identify potential food security risks, to stop corrective actions, to identify critical control points throughout the production process, to establish minimum and maximum levels for potentially harmful substances, to implement monitoring processes, to define corrective actions when critical levels are not met and to keep records. HACCP applies to several food categories including seafood, dairy products, meat and corn products.

Figure 1 - Food Management System (FMS) criteria comparison



Source: ITC Santards Map Benchmarking Tool.

As such, the HACCP system is not the only basis for food safety regulation worldwide, but it at the heart of every food safety standard, including those analysed in this chapter. None of the five standards grant compliance in the absence of a HACCP system. IFS and SQF also define the skills and knowledge required from the staff developing and maintaining the HACCP system. All standards except the Global G.A.P. also require employees dealing with the HACCP to receive adequate training for the application of the HACCP principles. Lastly, all standards reviewed in this chapter require plans and programs to verify the effectiveness of the system.

Food production site. The conditions on the food production site and precautions are essential measures in the proper management of food safety. All standards have strict requirements on the land adjacent to the cultivated land and the hygiene of the factory (manufacture, handling, storage, delivery). These requirements also include provisions for the entry points of farms, storage and packaging sites to prevent the access of unauthorised persons and the intrusion of rodents, birds and other animals. All standards focus on pest control procedures, the quality of water and microbiological monitoring, procedures for cleaning procedures, routine maintenance of facilities and the presence of sufficient hand and washing facilities and toilets. Primus GSF, IFS and SQF standards provide additional criteria for employees and visitors and raw materials and their potential for contamination, for packaging an for semi-processed and finished products. These standards (such as the FSSC 22000) also contain provisions about the condition of the premises, equipment and surfaces that should be easy to clean, free of toxic materials, peeling paint and forms of corrosion and rust.

Traceability systems. Traceability systems are the second pillar of food management systems. All five standards considered here require the implementation of a documented traceability system enabling the identification of all product inputs (including packaging) throughout the supply chain, from raw material suppliers to the customer. SQF requires the annual testing of the effectiveness of the system.

Handling of GMOs. Among the standards presented in this chapter, two explicitly refer to the issue of handling GMOs, IFS and GlobalG.A.P. The IFS requires the establishment of production site procedures for the identification of GMOs the definition of specifications required for raw materials and delivery documents that clearly identify products containing GMOs. The GlobalG.A.P. standard adopts an approach to compliance with applicable legislation in the country of production and requires documentation of the handling and use of GMOs.

Risk of foreign bodies and cross contamination. The risks of contamination and introduction of waste, chemicals, and other potentially hazardous elements in the production cycle are addressed by all the standards analysed. The criteria adopted by these standards can be classified as follows: glass and wood, chemical storage, site and equipment, waste disposal, and detection of foreign bodies. The FSSC 22000 follows the ISO 22000 guidelines for the application of the criteria in this section. For glass and wood, both PrimusGFS and GlobalG.A.P. require the implementation of written management policies whereas the IFS adopts a risk-based approach. The SQF requires the identification and special handling of wood materials where appropriate. All standards require adequate storage condition for chemicals to avoid contamination. With regards to the production site and equipment, the IFS provides for inspections via a risk analysis. The PrimusGFS requires daily pre-operational inspections with systematic record keeping of all corrective actions as well as inspections of cutting surfaces and production areas. The SQF requires that all utensils and other items used in the production process be identified, maintained in good conditions and in a manner to avoid contamination. All standards discussed in this chapter provide for strict requirements regarding waste disposal according to domestic legislation (IFS), waste disposals in areas specifically provided for this purpose (GlobalG.A.P.) and prohibiting faecal material in production areas (PrimusGFS). Lastly, the PrimusGFS, IFS, and SQF all provide conditions to detect the presence of foreign bodies in the production process.

Production processes and product control. This section tackles the processes used downstream of the primary production. As such, standards that only cover primary production (e.g. GlobalG.A.P.) do not address certain criteria. This section addresses aspects such as raw material, intermediate and final product specifications, the product development process, packaging material and procedures, product analysis and testing, quality control, management of non-compliance, verification/calibration of monitoring devices and product transportation procedures. The IFS is the only standard that covers all the above-mentioned criteria. The IFS guidelines require either compliance with applicable national laws or the application of recognised standards or specifications (e.g. HAACP). Quality control is not specifically addressed by the GlobalG.A.P. but the equipment used in the GlobalG.A.P. critical control

points must be verified to ensure accuracy and proper functioning. With regards to product specifications throughout the production process, PrimusGFS, IFS, and SQF all require appropriate documentation. In terms of packaging, most standards either follow national legal requirements for packaging specifications or stipulate that packaging must be clean (uncontaminated) and specifically designed for the particular product produced. The same requirements also apply to the product transportation criteria covered by the standards. Product analysis and testing (based on national legal requirements and specific programmes) requirements are present in the PrimusGFS, IFS, and SQF. The GlobalG.A.P. sets out requirements related to residue levels in various product categories (crops, livestock, aquaculture, etc.). All the standards deal with non-compliance through a combination of reminder systems (PrimusGFS), management of specific non-compliance that may arise (IFS), quarantine products (SQF), or the management of certified or uncertified products (GlobalG.A.P.). Similarly, all standards addressed include requirements for the proper calibration of equipment and record keeping. As for the previously discussed criteria, FSSC 22000 requirements are based on ISO 22000 and ISO/TS 22002-1.

Personnel requirements. In addition to the criteria related to the product itself, private food quality and safety standards also contain important criteria for personnel that are crucial to the integrity and reliability of the overall production process. These criteria include training, staff hygiene, medical examinations and protective clothing. In this regard, all standards require training and accurate documentation of training content and frequency of training sessions. Moreover, all standards consider staff hygiene of primary importance requiring written policies (PrimusGFS, GlobalG.A.P., IFS) and prohibiting product handling by ill employees (PrimusGFS, SQF). Both GlobalG.A.P. and IFS require the existence of instructions that employees must follow in case of infections and communicable illnesses. The SQF standard requires the implementation of medical examination for all employees, contractors, and visitors. With regards to protective clothing, all standards require the wearing of protective clothing for workers in contact with products. However, GlobalG.A.P., IFS and SQF also specify the need for clean clothing and washing procedures. The PrimusGFS addresses the storage of protective clothing outside working hours, during breaks or when employees go to the toilet. Again, FSSC 22000 follows the requirements of the ISO 22000 standard.

Box 2: The agriculture negotiations for the accession of Algeria to the WTO

The WTO has received Algeria's application in June 1987 and negotiations for accession began in 1998, seven years after the abandonment of the country's socialist economic policies in favour of reforms focused on market economy. Algeria has resumed negotiations in April 2013. The WTO members have reviewed the situation in the bilateral negotiations on goods and services and continued the examination of the Algerian trade regime and related legislation. This examination is based on reports issued by a working group composed of non-Algerian UN ambassadors assigned to cover the liabilities of the candidate country in the application of WTO rules and the opening of its markets.

Algeria must still resolve a number of issues, such as monetary and fiscal policies, state ownership and privatisation, pricing policies, foreign exchange and payments,

competition policy, investment regime and trading rights. Other issues to be addressed include customs tariffs, other duties and charges, tariff quotas, fees and charges for services, the application of internal taxes, quantitative restrictions on imports and customs valuation. More specifically, members stated that substantial work needs to be done with regards to export subsidies, industrial policies and subsidies, technical barriers to trade, sanitary and phytosanitary measures, investment measures related to trade, procurement, transit, agricultural policies, trademarks, geographical indications and plant variety protection.

The agricultural sector in Algeria has enormous potential and is already one of Europe's world's largest food importers. Government efforts seek to develop the sector by granting long-term concessions to farmers, reducing the dependence on cereal and milk imports, reforming the important fishing industry and boosting exports. To increase agricultural exports, reforms have focused on the promotion of those goods that have a comparative advantage such as olives, wine and dates, as well as ensuring that the quality of those goods that comply with international standards. While the export potential of olives, wine and dates is considerable, in the past, the government has mainly focused on the goal of self-sufficiency in staple food. This explains why the country does not yet have general export structures. However, the government subsidizes wine and milk to improve the quality and competitiveness of these goods. Thus, Algeria still needs capacity building to improve agricultural trade and better manage food safety.

On the other hand, the prospect of trade liberalisation worries some Algerian and international experts, who fear that food exports, may not be up to international competition. Besides, Algeria may risk paying even more for its food imports on which it is heavily dependent. The EU – with which Algeria signed an association agreement in 2005 imposing reforms in the energy, agricultural and services sector – supports the accession of Algeria to the WTO that was expected in 2009. Negotiations were initiated in parallel to the creation of a free trade zone between Algeria and the EU by 2017. China, along with several Asian and Latin American countries, have also recently voiced support in favour of the accession of Algeria to the WTO. The eventual WTO accession means that Algeria is expected to eliminate some taxes, liberalize imports and exports, meet quality standards (regarding SPS) and protect intellectual property rights. The accession of Algeria to the WTO is now well under way. Nonetheless, the country still has to resolve a number of problems in key areas such as export subsidies for non-oil products. Among these efforts, agriculture plays a pivotal role, reflecting its importance for Algeria's socio-economic development.

Conclusion

Over the past decade, the private sector has developed standards for the governance of food safety and quality in global agro-food value chains. Although this is a global trend, it has a strong impact on agricultural trade in the Mediterranean region. These standards aim to manage compliance with national and international food safety and quality requirements in the production, processing and transportation of food. This is why they mainly focus on requirements for the application of standards and conformity assessment.

Although it is only based on five standards, our analysis shows that harmonisation efforts are well advanced. These standards share a set of common elements, such as the HACCP and traceability systems, precautions to be taken on the production site,

in product handling and packaging, a record keeping system and a system for claims management. The GFSI is certainly the main driver of this harmonisation.

However, despite the progress made in the harmonisation of food safety and quality standards, the considerable amount of notifications to the WTO related to food safety issues is a source of concern. The surveys carried out by the ITC program on non-tariff measures, reveal that food safety standards are a recurring issue for exporters worldwide. Their strict requirements, the costs of compliance and the limited access to testing facilities are among the most prohibitive burdens for exporters.[9]

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9 - For more information about the ITC program on non-tariff measures, visit the International Trade Centre website (www.intracen.org/Non-tariff-measures-increasing-transparency-and-understanding).

CHAPTER 24

FROM AGRICULTURAL PRODUCTION TO AGRO-FOOD TRADE: THE ENERGY CHALLENGES

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Exceeding the threshold of seven billion people in 2011, the succession of economic crises since 2008, the overexploitation of natural resources, the effects of climate change and the ever increasing number of the poor and the enormous challenge of food security are among the world's major concerns. Food security depends on several factors including the availability of energy at all stages of the food chain. Every stage requires a certain type of energy, from farming operations, such as ploughing, fertilising, harvesting, all of them increasingly mechanised, to packaging, transport and storage.

The use of energy in agriculture is subject to a number of constraints. On the one hand, its cost is rising in a context of increased pressure on fossil resources and, on the other hand, the carbon constraint now imposed on countries that signed the Kyoto Protocol (the Annex 1 countries). Even some non-signatory countries are voluntarily contributing to this international effort, and this is partly in the interest of the agriculture and food sector.

Due to this dual constraint, the competitiveness of agricultural and agro-food chains is increasingly related to the performance of their logistics systems and the optimisation of their direct and indirect energy consumption. This is becoming an increasingly decisive factor in the production costs of final food products throughout the logistics chain. Therefore, efforts need to be made to improve energy efficiency and to develop renewable energy in the agricultural sector.

In this context, this chapter seeks to provide an overview of energy requirements in agricultural production systems in farms, and then in distribution systems for agricultural and agro-food products at national and international levels. It will also identify the constraints that these systems face while reflecting on their future

prospects. Two countries, Morocco on the southern shore and France on the northern shore will be particularly analysed.

Energy and agricultural activity

Agriculture is dependent on the quantity and form of used energy. Its modernisation is often synonymous with motorisation[1] at all levels of the chain: supply of the higher quality inputs, motorisation of farming operations, packaging, storage and primary on-farm processing. The issue of the competitiveness of Mediterranean products requires a study of the entire value chain from producer to consumer.

Energy balances in agriculture and streamlining tools

A first characterisation of farms according to their energy performance can be established through the indicator of "direct on-farm energy consumption in national total energy consumption". This indicator shows that between the early 1990s and early 2000s, the highest increase in the agricultural share was in Turkey with 59%, while Portugal had the biggest decline (- 23 %) (OECD, 2008).

Another way of estimating energy costs lies in the evaluation of the total energy cost of production, taking into account the energy equivalent of all costs, whether direct such as labour, fuel, lubricants and electricity, or indirect such as agricultural inputs, equipment and buildings. This cost continues to rise in the Southern and Eastern Mediterranean countries (SEMC), which have had to modernise their agriculture by motorisation and a greater use of higher quality inputs, especially fertilisers, the energy content of which is considerable, seed and seedling, and pesticides. Despite the importance of this question, rare are the publications that compile the balances for field crops in these countries. For example in Morocco, balances were estimated for potatoes (Baali, 1994), cereals (Baali and Van Ouwerkerk, 2005), sugar beet and sugar cane (Mrini, 2002). In all these cases, the energy balances present fertilisers as the highest energy cost item, assuming, of course, that it is a rational fertilisation corresponding to the real needs of the crops. However, this excludes many sectors of agriculture in the poorest Mediterranean countries. It is, therefore not surprising that the average quantities per hectare remain low in the Maghreb and in the Balkans, in particular, due to the weak financial capacity of the small farmers who constitute the majority of the rural population in these regions (see Table 1).

The other determinant factor in energy costs concerns mechanisation. In the Northern Mediterranean Countries (NMC), the productivity of machines needs to be improved and production costs need to be optimised in the pursuit of sustainability. Agriculture consume more energy to improve human productivity and fulfil socio-economic roles, especially in terms of food security and job creation, while becoming more polluting, in particular through greenhouse gas emissions[2] due to the combustion of fossil fuels.

1 - The term "mechanisation" is often used, but this is a misnomer.

2 - At the end of 2012, consumption of oil products in these countries was between 78 and 99.2%, except in France and Albania (CIHEAM, *Indicators 2012*).

Table 1 - Fertiliser consumption in the Mediterranean countries for 2008, 2009 and 2010 (in kilograms per hectare of arable land)

	2008	2009	2010
Albania	75.9	88.9	83.3
Algeria	8.6	7.8	12.7
Bosnia and Herzegovina	11.9	32.2	21.9
Cyprus	112	179.7	203.7
Croatia	495.6	249.2	223.5
Egypt	696.6	502.8	605.1
Spain	106.5	96.9	130.7
France	151.9	148.3	150
FYROM	56.2	56.9	67.1
Greece	118.3	81.6	153.7
Israel	280.6	200.5	200.3
Italy	144	116.2	122.8
Jordan	337.4	357.6	128.6
Lebanon	219.6	234.3	296.7
Libya	27.3	40.3	45.3
Malta	74	75.8	54.8
Morocco	53.8	41.9	39.1
Montenegro	14.8	11.3	14.4
Palestine	–	–	–
Portugal	161.6	133.4	148.7
Slovenia	285.1	241.9	287.5
Syria	–	–	–
Tunisia	34.4	43.5	40.4
Turkey	72.0	96.5	90.8

Source: World Bank, *World Bank Statistics*, 2013 (http://data.worldbank.org/indicator).

In contrast to agriculture in the NMC, that of SMECs is generally less mechanised. However, energy costs are not necessarily proportional to mechanisation, as the fragmentation of farms and their small size require greater transport times for farm

machinery. This is reflected in empty or unnecessary journeys and relatively higher energy costs than in the case of rational use and a choice of the size of the equipment fleet tailored to the needs of the farm.

Potential economy savings to be exploited

While motorisation is lagging behind in SEMCs, it is nevertheless accelerating due to the explosion of agricultural prices, the shortage of labour due to the rural exodus towards urban centres and competition from other sectors such as tourism and services. The case of Morocco is a good illustration of this. The fleet of agricultural tractors rose from 43,000 units in 1997 to 64,000 units in 2010, i.e. an average annual increase of 3.75%, while it was only 1.7% in the previous decade (FAO and MAPM, 2011). The use of increasingly large tractors and, more generally, agricultural machinery, obviously increases energy needs. Based on the available data, the current annual consumption of agricultural tractors alone is estimated at over 15 million tonnes of fuel in the Mediterranean, not including the energy needed for irrigation (fuel, electricity and butane gas).

Studies carried out in Morocco have shown, not surprisingly, that fuel costs weigh heavily on the costs of tillage but the energy requirements per hectare can vary widely, up to fifteen times, compared with the so-called energy saving methods[3] (Dycker and Bourarach, 1992). The *Fondation Crédit Agricole du Maroc* and the National Agency for the Development of Renewable Energy and Energy Efficiency (ADEREE[4]) commissioned a study on ten efficient farms. Published in 2012, the study highlighted those direct energy items where considerable savings are possible: up to 25% on electricity consumption and up to 20% on fuel. By adopting best practices (adoption of conservation agriculture – less disturbance of the soil, appropriate rotations, ground coverage with residues or a suitable ground cover plant and direct sowing[5] –, combination or association of tools, organisation of working sites, rational management and efficient use of equipment), a modest reduction in diesel in agricultural operations of 5 litres per hectare would allow an annual saving of over 9,700 tonnes of fuel[6].

In addition, in SEMCs where motorised storage (front loader, rear bucket, Archimedes screw and elevator) is almost non-existent except in large farms, the new chain approach and the grouping or aggregation[7] of farmers allow a more rational use of equipment and infrastructure and thus savings on energy.

An examination of the energy balance in plant production shows that wheat (in Morocco, for example) is produced at an average energy cost of 14 gigajoules (GJ)

3 - A disc plough followed by a rotavator consumes 92 kWh/ha, a stubble or cover-crop plough 38 kWh/ha, a chisel or rotary cultivator 68 kWh/ha, and direct sowing only 6 kWh/ha.

4 - Agence nationale pour le dévleoppement des énergies renouvelables et de l'efficacité énergétique (translator's note).

5 - See, among others, *Hommes, terre et eaux*, special issue "Agriculture de conservation", 149-150, September-December 2011.

6 - Figure updated from results given by Bourarach (1997).

7 - The concept of aggregation, grouping of small farmers around a private operator (specialising in marketing or transformation) under a contractual arrangement for the delivery of their products in return for input procurement services, agricultural advice and collection and transport of agricultural products.

per hectare, of which 24% is direct energy and 76% indirect energy. Fertilisers account for 60% of indirect energy followed by fuel (24%) and machinery and seed (5% each) (Baali and Van Ouwerkerk, 2005). Hence the need to act at the level of farming practices to reduce, firstly, the share of fertilisers and, then, fuel. This is possible, as indicated above, by adopting conservation agriculture, banning ploughing (energy voracious), practising direct sowing and adopting practices such as rotation or association of crops or inoculation which reduce the proportion of fertilisers in the energy balance (see Box 1). The energy value of the main products (grain) and by-products (straw) has been estimated at 68 GJ/ha, and the output/input ratio at 4.9 (Ramah and Baali, 2012).

Box 1: Agroecology

In France, the concept of agroecology is strongly advocated by the Minister of Agriculture, Stéphane le Foll, who, in 2013, launched an alternative way of producing, in a programme entitled "*Produire autrement*", encouraging a change in farming practice, towards a systemic way of working, as opposed to intensive farming. The objective is to limit the quantity of inputs, including phytosanitary products (herbicides, antibiotics), to preserve natural resources and facilitate their renewal. These so-called new methods are, in fact, ancestral developing methods, which take account of the complementarity of natural characteristics present in ecosystems in order to reduce the impact of agriculture on the environment. The improvement in productivity of farms, in particular through careful selection of seed and livestock breeds, diversion of water courses to feed irrigation systems and reduced use of agricultural machines, are all ways of saving energy resources. This view is supported by the National Institute for Agricultural Research (INRA), which, in 2005, launched an applied research programme in the Île-de-France, *Grignon Énergie Positive*, in collaboration with the AgroParisTech University. Lastly, at international level, the United Nations Special Rapporteur on the right to food, Olivier de Schutter, has frequently spoken in favour of agroecology, whose concepts are applied in several UN development programmes around the world.

Céline Huber, Consultant (France).

Sources: Grignon Énergie Positive; Agroecology Project for France (2013); "Produisons autrement" (http://agriculture.gouv.fr/).

Water saving through the use of localised irrigation is another tool to save both water and energy (less wastage and less pressure on pumping)[8]. It hardly needs to be recalled that irrigation is one of the most energy-voracious farming operations. The French Environment and Energy Management Agency (ADEME) has assessed the unit energy needs of sprinkler irrigation at 1 kilowatt-hour (kWh) per m^3 and drip irrigation at 0.3 kWh/m^3. Based on irrigation data for potatoes in France and Morocco, the energy cost can be estimated at 1.2 kWh/m^3 for sprinkler irrigation (total coverage), and 0.6 kWh/m^3 for drip irrigation (localised irrigation) (Ginoux, 2010).

For livestock production, energy savings can be found in the milking shed, where some 75% of the farm's total electricity consumption is used to heat water, feed the

8 - A study by the National Research Institute of Science and Technology for Environment and Agriculture (IRSTEA, ex-CEMAGREF).

vacuum pump and cool the milk tank, which represents between 48 and 70.5 Wh/litre of milk[9].

Apart from making savings, the Mediterranean countries should develop the use of renewable energy, still little used or negligible in SEMCs. Although the last decade has seen the emergence of a large number of initiatives and projects for the development of renewable energy, the latter are still scattered and they little involve agriculture as a source of energy supply. However, in Europe, biomass is increasingly emerging as a crucial tool for achieving the goal of 20% renewable energy in the EU's energy mix by 2020 (Keramane, 2010), and the development of agricultural and forestry products and by-products is a real niche market for energy production (heat, gas, charcoal, etc.) (Gac, 1980).

In the SEMC, renewable energy is slightly used in farms, but it is not sufficiently encouraged. Incentives are lagging behind, especially in reaching small and medium-sized farms, while the regulations do not always follow. For example, in Morocco, the legislation does not always provide for feeding electricity into the low voltage grid, thus, for the time being, this prevents energy efficient farms from benefiting from the surplus renewable energy that they can generate. Following the launch in 2008 of several large renewable energy development sites in the framework of the National Energy Strategy 2030, large-scale actions were initiated in 2013 to develop renewable energy in agriculture (see Box 2).

Box 2: Development of clean energy in Morocco

Like other emerging countries, in 2008, Morocco, launched new sectoral strategies to ensure its economic growth, including the National Energy Strategy and the Green Morocco Plan. Annual energy consumption per capita rose from 0.36 tonne of oil equivalent (TOE) in 2002 to 0.51 TOE in 2010. During the same period, energy consumption has increased from 15.5 to 26.5 terawatt/hour (TWh), representing an average annual increase of 6.9%. In 2011, the installed capacity was 6.4GW, of which 25% came from renewable energy (MEMEE, 2011).

To address a growing need for energy[10] while reducing dependence on imported fossil fuels and preserving the environment, the energy mix chosen by Morocco will be dominated by green energies. By 2020 and without considering biomass, renewable energy is expected to account for 42% of the installed capacity, 14% solar, 14% wind and 14% water, in addition to 12% of energy savings achieved through the promotion of energy efficiency.

These renewable energy development projects have two underlying objectives, which are cost savings and reducing greenhouse gas emissions. The Moroccan solar energy project plans to build thermo-solar power stations at five sites by 2020 (Ouarzazate, Ain Beni Mathar, Foum El Oued, Boujdour and Sebkha Tah) with total power generating capacity of around 2,000 MW, or 14% of electrical energy. This type of project is supported by some public bodies such as the African Development Bank (ADB)

9 - Ardennes Local Energy Agency (ALE 08), *Économie d'énergie dans les salles de traite bovin-lait du Département des Ardennes*, Charleville-Mézières, ALE 08, 2008.

10 - The demand for primary energy is expected to double by 2020 and triple by 2030. The demand for electricity is expected to double by 2020 and increase fourfold by 2030.

which, in particular, has contributed to the construction of the thermo-solar power stations of Ain Beni Mathar and Ouarzazate, and financed the construction of new wind farms in the framework of the Integrated Wind, Water and Rural Electrification Programme (PIEHER), with a loan of 360 million euros and a subsidised loan of 125 million dollars from the Clean Technology Fund. The PIEHER plans to build four new wind farms with a total capacity of 750 MW, and bringing to 1,000 MW the production capacity of the National Office of Electricity and Drinking Water with solar Energy.

In April 2013, at the Agriculture Fair, ADEREE and the Crédit Agricole signed an agreement for the development of solar pumping raising 47.8 million dollars to finance the equipment of farm solar pumps. The details of this project have been launched on 17 June 2013 by the Ministry of Agriculture and the Ministry of Energy. It plans to allocate 47.8 million dollars to fund 50% of the equipment of small farms with solar motor pumps, from 2014 and for several years.

In May 2013, among new projects, the MEMEE launched new workshops of the Energy Efficiency Forum in five sectors: construction, public lighting, industry, agriculture and fisheries, and transport. Long neglected, agriculture, which accounts for 13% of the national direct energy balance, is now regarded as a niche to explore (ADEREE, 2013). The results of these workshops will be ready by the end of 2013.

Sources: LaNouvelleT.com *(2013); ONE (www.one.org.ma/);* Desert Power 2050 *(www.dii-eumena.com/fr/dp2050.html); ADEME (2012).*

In France, the Energy Performance Plan for Farms 2009-2013 (PPE) is at the centre of this strategy of developing renewable energies and, more broadly, the rationalisation of energy. It is intended to support the energy transition necessary to achieve the goal established by the Grenelle I Act of 30% of low-energy farms by 2013. The management of the energy demand is the first challenge for this transition. In particular, it implies a better understanding of energy expenditure, the dissemination of a decision-making tool, energy diagnostics and the use of energy-efficient equipment associated with the production of renewable energy (Allain, 2011).

Box 3: Energy Performance Plan (PPE), France (2009-2013)

The eight pillars of the Energy Performance Plan

1) Better evaluation of the energy balance of farms.

2) Mass dissemination of energy diagnostics.

3) Improved energy efficiency of agricultural equipment.

4) Improved energy efficiency of agricultural production.

5) Promotion of renewable energy generation.

6) Special consideration given to the specific characteristics of the Overseas Departments.

7) Promotion of research and innovation.

8) Organisation of the national monitoring of the plan and its regional components, and communication of the energy performance improvements.

The dependence of agriculture on energy

The ADEME economic analysis of the dependence of agriculture on energy, *Analyse économique de la dépendance de l'agriculture à l'énergie. Evaluation, analyse rétrospective depuis 1990, scénarios d'évolution à 2020* (2012):

- Estimates that the ratio of direct energy costs to variable costs would reach, in 2015 (oil price peak, 150 dollars per barrel), 18% for main crops, mixed farming, cattle farming and dairy farming and 21% for horticulture, polyculture and seedeaters;
- Examines how self-generation of renewable energy on farms for own consumption (solar water-heating, anaerobic digestion, biomass, etc.) or re-sale (photovoltaic, for example) can help reduce the sector's energy dependence;
- Estimates at 52 TWh, the total production of renewable energy in the agriculture sector by 2020 (excluding the contribution of forests, hedges and agricultural waste) which represents some 13% of national targets, with widely varying contributions by different bio energies: some 90% of bio fuels (entirely of agricultural origin); 59% of biogas of agricultural origin; 14% of photovoltaic solar; between 0.2 and 3% of heat from biomass, wind and geothermal;
- Estimates that the generation of renewable energy in the agricultural sector would be equivalent to the income of some 5 billion euros (for comparison, this amount represents some 10% of France's farming GDP in 2009 or 50% of subsidies under the Common Agricultural Policy in 2009).

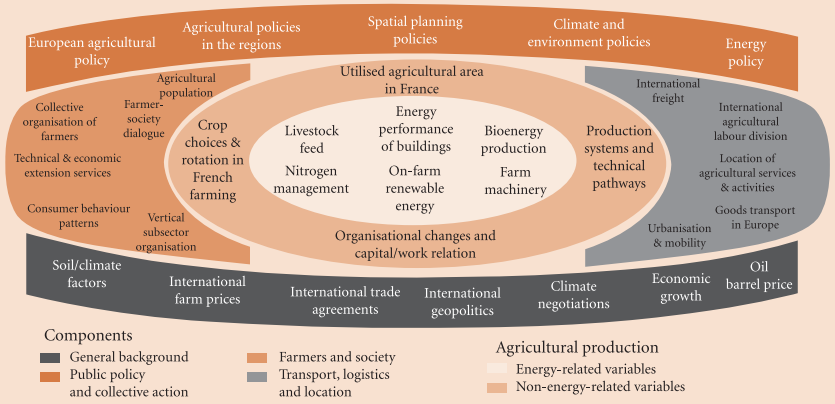
Based on GES-energy diagnostics, support for investment and innovative projects, the PPE made it possible to considerably improve the efficiency of farms (see Box 3). Their improved self-sufficiency in energy results from the production of renewable energies (agricultural biogas, agro-fuels, solar, wind) and the rationalisation of energy use (buildings, greenhouses, etc.) (Bochu *et al.*, 2005). Other measures are envisaged to support this self-sufficiency: choice of crop rotation including leguminous plants, adoption of non-ploughing farming methods, maintenance and adjustment of agricultural equipment.

National commitments up to 2020 are ambitious. Spain expects the share of renewable energies in energy generation to be 22.7%, France 23%, Greece 20% and Italy 17% (ENERMED, 2011). Morocco plans to increase this share to 42%. States obviously play a very important role in implementing national strategies and plans through a variety of financial and administrative measures: information, training, advocacy, regulation, fixed-price purchase of sustainable electricity, establishment of agencies dedicated to renewable energy, etc.

Box 4: Agriculture and energy 2030 in France

The study carried out in France by the *Agriculture Énergie 2030 Group*, under the direction of the *Centre d'études et de prospective* (CEP) of the Ministry of Agriculture, Food and Forestry, on the complex relations between agriculture and energy, led to a diagnosis of the situation and the construction of four evolutionary scenarios up to the horizon of 2030. The Group identified 33 useful variables, grouped into five components (see Figure 1).

Figure 1 - Model of the different explanatory variables of the agriculture-energy system



Source: Ministry of Agriculture, Food and Forestry, SSP, CEP, 2009.

Among the interesting components, it is worth noting:

- Transport, logistics and location (international freight, international agricultural labour division, location of agricultural services and activities, regional and national transport of goods, urbanisation and mobility);
- Agricultural production (crop choices and rotation, production systems and technical pathways, utilised agricultural areas, nitrogen management, organisational changes and capital/work relation, farm machinery, on-farm renewable energy, bio energy production, energy performance of buildings and livestock feed);
- Public policies and collective action ("Mediterranean" agricultural policy, agricultural policies in the regions, planning policies, climate and environmental policies and energy policies);
- The global context (soil/climate factors, international farm prices, international trade agreements, international geopolitics, climate negotiations, economic growth and oil barrel price);
- Farmers and society (agricultural population, collective organisation of farmers, technical and economic extension services, consumer behaviour patterns, vertical subsector organisation).

Energy and the logistics of domestic transport flows

In the northern Mediterranean countries, the transport of agricultural and agro-food products is dominated by road haulage with specialised and structured firms. The specialisation of agriculture into areas of production, permitted under the Common Agricultural Policy, has increased the distance between consumers and producers. In general, the costs of transport and, in particular, its energy needs, require greater geographical concentration to reduce costs of collection (competitive production areas) and distribution (concentration as close to demand as possible) (Daniel, 2009).

The energy question is thus an issue for the transport of agricultural products. In France, the Ministry of Ecology, Sustainable Development and Energy (MEDDE)

and ADEME, in collaboration with transport professionals, have implemented the "*Objectif* CO_2" Charter which provides for the reduction of carbon gas emissions while optimising fuel consumption through a voluntary self-diagnostic system and regular monitoring of four factors, the vehicle, the fuel, the driver and the organisation of transport flows (MEDDE and ADEME, 2012). The transport of agricultural products is, of course, included in the scope of the Charter.

The recent development of short supply chains in suburban areas reflects a desire to guarantee the origin of products and reduce the carbon footprint by reducing greenhouse gases and transport energy needs. Although in the SEMCs, the transport of agricultural and agro-food products is also essentially done by road, the lack of road infrastructure, especially at local level, hinders the movement of products. Trade is still poorly organised with a predominant informal sector. Small, non-specialised enterprises operate without respect for quality standards or optimisation of resources, giving rise to loss of quality and higher final costs. In addition, the vehicle fleet is generally obsolete.

Some countries, such as Morocco, Algeria and Turkey, have adopted national strategies to develop road transport and logistics in general. For their part, the rapidly developing major distribution and agro-industry are driving the creation of enterprises specialising in logistics and encouraging them to adopt good practices and respect standards relating to equipment and processes. Thus, geolocation or remote monitoring of vehicles is a flourishing market in SEMCs. It allows transporters and depot locations to be listed and identified. Thanks to the calculation and budgeting of distances travelled, it allows the optimal use of fuel. In Algeria, for example, established in 2008, the IDE-Net Company is one of the leaders in the sector, despite the legal vacuum, which is becoming increasingly restrictive for the development of this type of activity. Many projects are emerging in this field, notably adapting geolocation to agriculture. The mapping of farms and roads will, in due course, make them more accessible and thus facilitate transport to storage sites. It should be noted that the quantitative and qualitative inadequacy of storage facilities compared with the needs, leads to much wastage but also high energy requirements and costs, which are still little quantified in the countries of the region[11].

International transport

At international level, the issue of the transportation of agricultural products is also crucial in terms of environmental and energy implications. Air transport concerns small quantities of high value fresh products (flowers, fruit and vegetables), but is hampered by its costs and especially its high carbon footprint (Farm Credit Canada, 2008). Essentially required both in the northern and southern Mediterranean for the

11 - The consumption of direct energy in the road haulage sector in Morocco is estimated at 35% of that of the country's total economic activities. Fuel costs account for 38 to 40% of the cost and 40 to 50% of turnover depending on the age of the vehicle and the segment of activity (Transport Federation and General Confederation of Moroccan Enterprises, 2010). In France, the transport and agriculture sector account for 30.3% and 2.7% of the country's total energy consumption (Laponche, 2011). In addition, the adoption of cereals platforms and the replacement of road transport by rail transport should reduce the cost of transport by up to 30% (MET, 2010).

transport of cereals, and still little developed in SEMCs despite efforts to catch up, rail transport does not always allow the successful transfer of agricultural and agro-food products, which require just-in-time delivery, a continuous cold chain and short delivery times.

It is thus road transport, which prevails throughout the Mediterranean, primarily because trade often concerns neighbouring countries but also because this mode of conveyance has been the most developed for the last fifty years. However, the saturation of certain sections and the growing environmental awareness are gradually recalling its pre-eminence, especially for refrigerated trucks. Maritime transport therefore embodies the hope of a clean and ultimately cheaper carriage. The development of the use of containers and their standardisation has allowed them to be fully integrated in the logistics chain. Containerisation is part of a pattern of standardisation of the maritime and port spheres through the standardisation of logistics procedures. Container transport costs are also 30% lower than road transport costs for the same delivery times (about three days). Thus, road transport between Agadir and Perpignan represents 25% of the total cost price of a kilogram of tomatoes, against some 20% for container transport (Kellou, 2012).

Table 2 provides a comparison between international road transport and container transport in the trade between Morocco and Europe. More efficient in terms of cost, security of goods and environmental footprint, container transport is less advantageous with regards to timing, frequency, diversity of delivery points and storage and the information management and handling operations (Kellou, 2012). However, an improvement in performance is possible thanks to the development of multimodal interconnections, the grouping of products to be transported and the organisation in clusters. Despite this competitive advantage and the value of increasingly common containerisation, maritime ports continue to lag behind in terms of facilities and the integration of other transport networks. The total container capacity of the top fifteen Mediterranean ports is less than that of the largest ports in the world (Gattuso, 2012). As has been observed, maritime freight is slow and fragmented, and has not achieved a minimum critical mass to allow it to provide frequent and scheduled connections. Movements between two Mediterranean ports, including customs formalities, handling, transport and stopovers, requires between twenty and twenty-five days (Gattuso, 2012). The development of port infrastructure in SEMCs would have a beneficial effect on the performance of maritime traffic throughout the region (Terrier, 2012; FEMISE, 2010), both in terms of economic competitiveness and, albeit to a lesser extent, energy efficiency.

Table 2 - Comparison between road transport and container transport between Morocco and Europe

Mode of transport	International road transport	Container transport
Costs	– – –	++
Journey times	+++	++
Frequency of deliveries	+++	+
Goods security	+	+++
Diversity of delivery points	++	+
Information management	+++	– –
Storage operations	+++	– – –
Environmental footprint	– – –	+++

Source: Kellou (2012).

Conclusion

The overview of logistics of the agriculture and agro-food sectors and their relationship with energy in the Mediterranean reveals an imbalance between the northern and the southern shores of the Mediterranean. SEMCs are lagging behind in the modernisation of their agriculture and logistics infrastructure for agricultural products, especially those for domestic use. This analysis shows that the use of energy can be significantly improved, both at farm level and at different stages of the logistics chain for agriculture and agro-food products.

The practice of energy balances allows the monitoring of the evolution of energy efficiency and its constant improvement. At farm level, it is important not to be limited to a goal of rational use of fossil fuels and their replacement by bio fuels, but to think in terms of a global ecobalance[12]. Exchanges between countries will allow standardised methods used to draw up these balances and the energy equivalents of inputs, equipment and agricultural products in energy units.

Farmers must be supported and encouraged to improve the energy performance of their farms. Other Mediterranean countries would benefit from following the example of the French PPE, which showed substantial potential for reducing energy consumption of fossil origin and considerable opportunities for the renewable energy generation, especially based on biomass.

In the futur, farms in Mediterranean countries must consider energy and water as essential and decisive competitive factors. This implies that the success stories are disseminated through multi-regional partnerships advocating the transfer of

12 - The ecobalance results from an analysis of the environmental impacts of a product or a process throughout its life cycle "from the cradle to the grave".

technology and best practices. Similarly, an industry approach and capacity building of agricultural professions can foster the implementation of national strategies in the field of agriculture, the objective of which is not only to promote energy efficiency but also to encourage the development of green/clean energies.

Despite the efforts of SEMCs in the transport sector, many shortcomings remain, especially in intermodal links. Road transport, especially at national level, is dominated by the informal sector and suffers both from its obsolete vehicle stock and the weakness of basic infrastructure. However, thanks to the strategies adopted by several countries, the development of major distribution and the growing entry of European firms into the international transport market in the sub region are increasingly encouraging the upgrade of the sector. Maritime transport, however, is still hampered by poor port facilities. Most of the major Euro-Mediterranean projects are tackling these constraints, for the sake of saving energy and reducing the carbon footprint.

The commitments of northern European countries in the framework of the Kyoto Protocol and the cooperation mechanisms that it offers, the projects adopted by the Union for the Mediterranean as commitments in the context of bilateral cooperation are likely to intensify trade and cooperation in the field of logistics, but also to disseminate the rational use of energy in agriculture and the agro-food industry. In order to measure these changes, a systematic collection of data from different Mediterranean countries, based on a common framework, would be essential. The Mediterranean region could be inspired by the work done in France by the *Agriculture Energie 2030 Group*, adopting a simplified approach to take account of the relatively disparate availability of data from one country to another.

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CHAPTER 25

FROM LOCAL MARKETS TO INTERNATIONAL TRADE: LOGISTICS AND DEBATE ON THE FOOD MILES CONCEPT

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Consumers in developed countries, including Europeans, are increasingly concerned about the distance that food must travel before reaching their plates. Distance is considered as a challenging issue for the future as it could affect international trade as well as local production. However, it is too early to state whether its impact will result from the reactions of consumers or the introduction of new policies.

The movement of products in the global context involves complex logistics approaches plus the difficulty of keeping many food products fresh, especially those that must be kept in constant refrigerated conditions. This is probably what makes the difference between these products and products of other sectors of the economy. Agricultural commodities in bulk are traded around the world but are hardly recognisable when they are become the finished food products that consumers buy.

Logistics has improved its efficiency in several ways. If petrol prices have been increasing, although with ups and downs, total costs have not been affected to the same extents through a better use of resources and logistics management capacity. Economic efficiency has prevailed over social and environmental considerations.

In most developed countries, citizens are becoming increasingly aware of the diverse implications of food supply and they are reacting accordingly. All issues have to be considered together to anticipate future socio-economic implications as well as to define policies that can mitigate damage or create better environments.

Firstly, some consumer concerns about food products are addressed in this chapter. The definition of local food is then analysed before the presentation of the main components of logistics impacting local food products and commodities coming from abroad. These concepts are then applied to the Mediterranean region.

Finally, socio-economic and political implications for the Mediterranean countries are considered.

Consumer concerns

Consumers evaluate food products by considering a range of criteria. With regards to finished products, the elements they consider are agricultural raw materials, processing methods and the presentation and related services. The first two are tangible and the second two are intangible. The third element is often related to the distribution system while the fourth is closely related to consumers themselves. The price that consumers are willing to pay is a result of all implicit and explicit evaluations of tangible and intangible attributes.

The value of intangible attributes have increased compared to tangible attributes. Producers often complain of the low value of raw materials when compared to the price paid by consumers. The image has a very strong impact on market prices and more money is invested to create positive perceptions of food products.

Quality assessments based on subjective perceptions combined with evaluations of objectives are very important. The quality control of various product attributes are also a common practice in the different processes of production, processing, distribution, and consumption. Food products must therefore be analysed throughout the agro-food chain, from production to consumption. The prices paid by consumers are final indicators of quality.

Logistics are involved in most processes along the supply chain. Consumer interest in logistics is also based on tangible and intangible attributes. Unlike the intangible aspects that are related to the perception of products, which are subjective, the tangible aspects of logistics can be measured. Nonetheless, intangible aspects could have a greater impact. The concept of food miles fits perfectly in this approach.

Consumer concerns about food miles can affect both local products and products coming from distant regions. In fact, the proximity between producers and consumers is an important issue (Albisu *et al.*, 2011). In both cases, consumers make purchasing decisions based on limited information and they also engage in environmental assessments (Teisl, 2011).

Box 1: Food waste: a growing concern

Food waste is part of the food loss that occurs when a food product is not consumed. There is a growing concern about food waste both in developed and developing countries. It has financial and environmental consequences as wasting food implies a loss of resources. Although it is difficult to obtain precise indicators, especially in developing countries, different institutions agree that around one third of the world food production is wasted. However, this estimation varies depending on the commodity considered. It is high for added sugar and sweeteners, as well as for fats and oils but much lower for tree nuts and peanuts. Fruits and vegetables concentrate the biggest losses both at post harvesting and distribution stages.

The proportion of losses also varies along the supply chain and consumption circumstances. Waste in households is greater than in other stages of the supply chain such as the manufacturing premises, food services and retail/wholesale establishments. It is at the wholesale and retail distribution stages where waste is the smallest. In developing countries losses occur mainly at early stages due to financial and technical constraints in harvesting techniques because of poor storage and cooling facilities. On the contrary, in the high-income countries, waste is mainly due to consumers.

This has implications on how to manage local production and transport of food products that travel long distances. Several measures are proposed, such as, better consumer education, consumption within the prescribed time, appropriate labelling, improved technical efficiency, modern infrastructure, storage facilities, longer shelf-life products, etc. Mediterranean countries should know the final destination of their food products in order to act accordingly. The treatment can be quite different depending on whether food products are sold at local markets or if they are exported to the demanding European markets. The information provided should be different because the labelling requirements strongly differ between developing and developed countries.

Local approaches to food

For centuries, most food products have been consumed locally. Today, the more developed a market is, the greater the share of products that come from non-local producers. There are many reasons to explain this trend including the consumers' desire to diversify their consumption, more efficient logistics allowing the availability of food products from distant places in a very short time. It is difficult to foresee from where competitors are coming because situations change within a few years.

The term local market has different meanings and distances from production to consumption can vary greatly with all that it entails in terms of logistics and the appreciations of local consumers. The question is to what extent distances affect product attributes and consumer awareness.

The term local can simply mean that consumers know the products and the producers or, that at least, they feel closer to the region where commodities are produced. This issue is currently the subject of renewed interest, especially in the EU. Interest in local production is a way to protect local producers from globalisation, to educate consumers and raise awareness on the consequences of a long supply chain. It is a good means of connecting agricultural producers and urban dwellers.

Taste and freshness have always been considered as important attributes of local products. Taste is closely associated to traditional and renowned food products. Freshness does not only depend on the distance but also on storage facilities. Recent advances in logistics solve a number of problems associated with food coming from distant production sites. However, the environmental impact related to the greater use of non-renewable resources has become part of consumer concerns. It is important to compare their subjective perceptions with objective analysis of reality.

Local food markets, regardless of terms of sale, rely on short food chains or circuits. The development of local food markets, which responds to economic considerations, is also driven by other reasons, such as, the desire to obtain fresh/healthy/organic products, lower carbon dioxide emissions, to promote solidarity between consumers and small farmers, to stimulate local/green economy, to enhance urban food security and the resilience of the urban food system.

There is a large diversity of approaches to short circuits or chains (Crioc, 2010) depending on whether one opts for short geographical distances between producers and consumers or the absence of intermediaries between the two. For instance, the Internet allows producers to be in direct contact with consumers. Markets and convenience shops are becoming increasingly popular at the expense of other forms of sale of local produce. They are the ideal option when offering seasonal products tailored to the needs of consumers. In 2013, the Joint Research Centre (JRC) has conducted an analysis of the social, environmental and economical benefits of short supply chains (JRC, 2013).

However, access to local products and their availability are challenges that are not so easy to overcome. They are often found in very specific places, or only in big cities, or available only on certain days of the week. Distribution is certainly one of their greatest weaknesses in short circuits. Consumers generally do their shopping in self-services stores that do not have access to local products so they find it inconvenient to go to special shops only to buy a small part of their fresh food. They occasionally do so but not on regular basis.

Local-regional foods are closely associated to images of small and family farms. This does not necessarily mean that other food products coming from more distant regions are produced in different farms. Family farms owners generally personally manage both production and marketing processes. Small producers tend to pay more attention to production than distribution mostly due to lack of time.

Patrick Mundler and Lucas Rumpus (2012) highlight the importance of the development of urban management policies allowing farms to be situated near cities and urban areas to supply local fruit and vegetable shops. The idea of transforming urban area in cultivated gardens is gaining ground. The economic impact is limited but it brings urban citizens closer to agricultural and rural environments.

Logistics infrastructure and transport means

With better infrastructure and transport means, logistics has made considerable progress. Air, land and sea transport are used for agro-food products although costs vary considerably from one means of transport to another.

Transport means

Air transport, which is the most expensive, is only used for high value and perishable products. Rail transportation costs vary from one country to another according to the existing infrastructure but it is too inflexible and too slow to be really effective. However, it is widely used for the transportation of cereals because the time is not

so important. Inland waterway transport is the least expensive and is commonly used, at least in countries with large rivers and where the amount of rainfall is sufficient. The EU expects that by 2050, around 50% of freight over 300 km would be either by train or by ship (European Commission, 2011). By 2030, the transfer from one mode of transport to another should be done under optimal conditions. The efficiency of transport and infrastructure depends largely on managerial capacities. There are significant differences between public and private management and in many European countries, infrastructure is owned state but their use is managed by private enterprises.

The final choice of a particular mode of transport of food products depends on several variables. Private companies do not generally take into consideration the public implications and environmental impact, unless they are subject to rules and standards. Final costs should incorporate all relevant aspects and the implications of the food miles concept should be more clearly defined. Studies on the reactions of consumers show that they are willing to pay more for local foods (Grebitus *et al.*, 2013). However, according to these authors, the marginal value of distance depends on the type of food. A fresh product requires refrigeration whereas a non-perishable food product consumes less energy for transportation and storage.

The carbon footprint

The use and the dependence on energy is becoming a critical issue in developed and developing countries. Food production and consumption need energy. Carbon Dioxide (CO_2) emission, known as the carbon footprint is one of the major factors of environmental degradation. These issues are the subject of great concern, especially as some stakeholders in the supply chain demand information on the water used and the carbon footprint linked to each food product, in its production and distribution process.

There is a consensus on the fact that emissions of carbon dioxide (CO_2) and other greenhouse gases (GHGs) into the atmosphere are the main causes of climate change. Agriculture accounts for 13% of global GHG emissions and about 30% when considering the treatment of soil, agrochemical production and agro-food trade (IPPC, 2007). Unlike many non-EU Mediterranean countries, Morocco has recorded a high carbon footprint for its agricultural sector.

The figures are variable and, for example, in 2006, in the United Kingdom, the stages of processing, transport, retail and household consumption in the food supply chain, accounted for two thirds of total GHG emissions, while agriculture itself represented the remainder third according to DEFRA (2008). In their recent study, Sonja J. Vermeulen *et al.* (2012), argue that agricultural practices in the United Kingdom account for a somewhat similar proportion of emissions, i.e. 40%. However, while recognising that the figures vary from one country to another, they believe that agricultural practices in the world account for 80% of total emissions, taking the entire food system into account.

Consumers are more or less sensitive to the problem of carbon footprint and are more or less willing to buy food products whose carbon footprint is smaller

(Koistinen *et al.*, 2013). Nevertheless, as with any sensitive issues, there is always a proportion of the population that determines the evolution of things. In developed markets, the food distribution system adapts to the needs of consumers when the introduction of certain standards can be beneficial.

Carbon footprint information is not compulsory but there are some food distribution chains are already setting norms standards and recommendations for their suppliers. This is the case of Tesco in England and Wal-Mart in the United States. These new policies will have an impact on products imported from distant regions or even on international agreements, which do not include such concerns and could be considered as discriminatory. The World Trade Organization is sensitive to the issue of sustainable development but it believes that national standards should not intervene in international trade flows by setting their own levels.

Implications on food products

In response to the concerns of their readers, daily newspapers and specialised journals talk about what happens when agro-food products travel great distances. For example, consumers believe that fruit and vegetables lose their vitamins and minerals and that local food or frozen products are more likely to preserve their nutritional value.

The concept of reducing food miles attracts many consumers in developed countries. For them, food miles might be a simple metaphor opposing local and international food systems. Restaurants and retailers strive to offer local products, knowing that their customers consider them to be safer and fresher than products that come from far away and at the same time, they have the opportunity to consume local products.

Graziella Benedetto (2011) suggested that the distance travelled might be less important that then the means of transportation used. She reported that a winery in New Zealand calculated the CO_2 emissions of the shipping of a crate of wine bottles travelling to London, which proved equal to the emission of a crate of bottles transported by truck over 1,000 km in France.

Some people think that the only reasonable way to deal with the issue is to provide relevant information to consumers and let them decide whether it is important for them or not. Consequently, they will buy food products according to the importance they attach to the issue. However, this information could have an impact on the prices paid for local products or divert the consumer from food products coming from distance sources.

In order to achieve a better understanding of the implications of food miles, researchers have tried to define all kinds of measures. It is important to have information not only on the means of transport but on the entire supply system, from the production of raw materials, their processing and their final distribution, including wholesale and retail. There are also clear differences between fresh and non-perishable products. Fresh products such as fruits and vegetables usually suffer more from long-distance transport.

Patrick Mundler and Lucas Rumpus (2012) suggest that the local distribution of fruits and vegetables can be as effective as the system of supermarkets. David Coley *et al.* (2009) found that if customers have to travel a round-trip of more than 6.7 km to buy their organic vegetables, their carbon emissions were then likely to be greater than the emissions associated to the system of cold storage, packaging, transport to a regional hub and the final delivery to the customer's household used by large-scale suppliers.

The population is increasingly concentrated in cities. Road transport is almost the only mode of transport for urban deliveries in the framework of the so-called last mile logistics (Morganti, 2013). Urban food planning covers issues related to wholesale, intra-urban transport and any form of retail. The final delivery, which is the least effective part of the supply chain, should be reviewed, especially in developed countries.

Local supply and international trade in the Mediterranean

Local production prevails over international trade in most southern Mediterranean countries and for most finished food products. However, the situation is quite different in northern EU Mediterranean countries due to their economic development, transportation means, market infrastructures and consumer decisions. Globalisation encourages imports of foods from all over the world. However, local produce is very popular among consumers as they represent their traditions and culinary roots.

The percentage of population living in urban areas in the Mediterranean countries has been constantly increasing. In developing countries, in the proportion of the population living in cities is often between 60% and 80% (CIHEAM, 2012). The largest urban areas are mostly on the cost and it is rare to find large cities inland. The food supply sources are often close to consumers. Some cities have magnificent harbours where almost all exports transit but they also receive large volumes of imports. Railroads do not play a very important role in the transport of fresh food and trucks are the main mode of transport although the percentage of refrigerated vehicles is low. It can be said that railway infrastructure is poor and truck transport services are highly fragmented in many small businesses.

Economic development is always accompanied by a change in habits, consumers started preferring local food products to international ones, or those coming from more distant production areas. Trade flows are increasing all over the world. The EU is the world's largest importer of agro-food products and maintains intensive trade relations with non-EU Mediterranean countries especially since 2006, when new policies were established to liberalise trade.

Trade between the EU Mediterranean countries and the rest of the EU is particularly intense. However, trade between non EU Mediterranean countries is very limited mainly due to lack of road infrastructure and non-tariff barriers (Catram *et al.*, 2009). Domenico Gattuso's book (2008), whose first part is devoted to interactions between logistics, the agro-food sector and Mediterranean features, gives an interesting account of agro-food logistics in the Mediterranean region.

Today, there are new agreements that aim to boost trade between the Maghreb countries but transport costs to the EU remain below the cost of transport between the neighbouring countries of the region. Other similar initiatives have been undertaken in other areas of the Mediterranean like the Black Sea Economic Cooperation. The Union for the Mediterranean is another forum to solve common issues and consequently to promote trade between southern Mediterranean countries.

The Logismed initiative of the European Investment Bank strives to develop the logistics sector in Mediterranean Partner Countries (MPCs) through the creation of a network of Euro-Mediterranean logistic platforms. This should encourage trade between non EU Mediterranean countries and reduce logistic costs. Domenico Gattuso (2012) stresses the importance of improving these Mediterranean networks, by paying special attention to the port system and the relationship between Mediterranean countries.

Southern Mediterranean countries, with the exception of Turkey and Morocco, have increased their dependence on imports of agro-food products thus unbalancing their trade flows with the EU (Abis, 2012). Their imports are diversifying and emerging countries as well as far away countries are beginning to have a stronger presence in their markets (Brazil, Canada, China, India, Russia, South Africa, Ukraine and United States).

It is expected that this trend will assert itself in the years to come particularly with regards to products such as cereals, sugar, meat and animal feeds unless new agreements will emerge between Mediterranean countries. This diversification of their exports can also be observed in the case of fruits and vegetables. Morocco is exporting to growing markets like those of Russia, USA, Canada and Middle Eastern countries.

Some large emerging countries have monetary surpluses and they are willing to invest a lot of money in infrastructures in the Mediterranean area, in order to facilitate exports. This is the case for China, for example, with large investments in Greece and Spain. Far away countries like the United States and Canada and emerging countries like Brazil, focus on exports of agricultural commodities rather than finished food products. Cereals and soybeans are good examples. Meanwhile, the UE exports both agricultural commodities and finished agro-food products.

Most trade is transported by ships in the Mediterranean. Trucks are used to move goods from countries close to the EU, such as Morocco and Turkey, although distances are quite significant between countries of origin and countries of destination. Sea motorways and intermodal platforms should allow shipping to increase in efficiency and attractiveness. Better roads and rolling equipment will also reduce the environmental impact of exports.

Box 2: GMOs and Trade

The debate on GMO (Genetically Modified Organism) food products is one of the most controversial of the last 30 years. The European Union has adopted legislation on GMO's in the environment and their traceability (2001/18/EU and 1830/2003). Therefore, each country has developed a particular biosafety scheme in accordance with the EU regulations to ensure labeling, traceability and proper documentation obligations thus complicating international trade. There are many examples of agro-food cargoes inspected by different authorities in different countries. Inspections are mostly accompanied by laboratory analyses. These analyses require a minimum of three days to be completed according to ISO17025. Due to the highly sensitive nature of the biotechnological methodologies (polymerase chain reaction) used for the detection of GMOs, disputes are not uncommon. Sometimes, the same agro-food cargo is classified as genetically modified in one country and not in another. The amazing thing is that often, both laboratory analyses are correct due to the sampling factor. One sample can give a positive test and the other one, a negative test just due to chance and the huge amount of products (thousands of tonnes of agro-food products) to be inspected. These incidences lead to problems and disputes compromising the relationship of trust between trade partners within a country between different countries.

One of the most complicated cases is that of processed soya imported from Latin America and the United States. There are several processing events which are prohibited for products intended for human consumption, so that once detected, the presence of GMO soya in cargo ships entering EU ports, it is necessary to identify the specific processing event among the 11 available in the case soya. This causes significant delays in the trade of this important commodity.

These issues further complicate international trade in genetically modified agricultural products and but they also affect trade in traditional agricultural products. Another very good example is the processed papaya fruit cut into small cubes and sold for processing into compotes. The major producers are the United States and Thailand. In the United States, most of the production is genetically modified but this is not the case in Thailand. Therefore, the EU requires documentation on the genetically modified status of these products after importation, complicating the trade of this processed horticultural product and causing delays that are costly.

For developing countries, agro-biotechnology is a particularly challenging phenomenon. The lack of sanitation, advanced plant protection and fertilisation schemes as well as the lack of post-harvest infrastructure pose problems which cannot be resolved in the space of a few years due to their socio-economic nature. GMO crops may be a solution but there are a number of constraints that should be taken into consideration. The most important is the acceptance of such crops by consumers in the developed world and they are a great opportunity to impose trade barriers. The EU is the best example. Therefore, although developed countries have established their national frameworks to deal with agro-biotechnology and biosafety, most developing countries are doing so under less flexible circumstances.

Panagiotis Kalaïtzis, CIHEAM-MAI Chania.

Political and socio-economic implications

In general, the issue of food miles has socio-economic implications for producers and consumers, which are necessary to identify and evaluate. This issue affects all Mediterranean countries, whether they are EU members or not, but with diverse impacts and their reactions can be more or less sensitive and more or less rapid.

EU and non EU Mediterranean countries should be aware of the consumers' sensitivity to food miles. All countries should closely monitor the evolution of things in the field knowing that their exports to other countries could be affected and their own societies could also be affected by imports coming from distant places. Exporting companies might have to justify their means of transport to European consumers, not only by improving their economic efficiency but also reporting on their environmental impacts.

Developing Mediterranean countries should improve their port infrastructures and reinforce efficient sea transport means to be competitive but also to convey messages in line with the concerns of EU consumers. In 2008, Morocco exported more than 80% of its tomatoes to France by truck whereas in 2012, 60% was transported by truck and 40% by ship (Kellou, 2012). The Moroccan road transport system has a unit cost per distance that is higher than that of Spain or Turkey. Sea transport is more advantageous and more respectful of the environment. The use of containers, as well as other rapid loading systems, has contributed to this change in favour of transport by ship rather than by truck.

The EU Marco Polo program, whose purpose is precisely to improve logistic competitiveness in Mediterranean countries, encouraged these changes. Meda-MoS develops the concept of sea highways. However, projects still need to be effective as the current operation of some of the new facilities have serious deficiencies while ports of northern shore increase their efficiency to oust their rival from the southern shore. Mustapha El Khayat (2011) notes that it will be necessary to establish a Mediterranean private-public partnership to find adequate solutions to achieve a more integrated logistics in the Mediterranean.

Of course, southern Mediterranean countries could also find a way to reduce excessive food imports that penalise local producers or, at least, to communicate the benefits of local produce to their urban consumers. Countries should consider the serious limitations that hinder local supply chains with poor wholesale, retail and transportation infrastructures. It should also be pointed out that a significant percentage of greenhouse gas emissions in the atmosphere not only result from transport, but also from the production of agricultural products. There are so many inefficiencies that are necessary to resolve. Consumers should be informed about these problems.

Policies should be directed towards the weaknesses of the agro-food system. For example, inefficient food production and transport in developing countries is of great importance while waste is of growing concern in developed countries due to the excessive use of energy. It would be a mistake not to focus on the most sensitive parts of the agro-food supply chain.

Food miles are a different factor when considered in terms of exports or imports, but in both cases policy measures could be more of a defensive nature. Policies related to imports may aim to protect consumers but may also be interpreted as non-tariff barriers. Sophisticated policy measures to protect consumers in developed countries are still likely to be misinterpreted by professionals in developing countries. This is why it is important to establish multilateral agreements to create a framework with clear rules.

Other ways to promote local products and avoid imports from distant regions include the introduction of a labelling system to distinguish and promote the local commodities to give them a higher value. The *Bozoor Baladi* (Seeds of my country) campaign in Egypt is an example of initiatives launched to encourage the consumption of locally produced fruits and vegetables.

According to Alexander Kasterine and David Vanzetti (2010) the indication of the carbon footprint and food miles on the label are likely to be ineffective, but also unfair for developing countries. They believe that this is a costly measure and poorly adapted to developing countries in the southern and eastern Mediterranean.

The policies established by retailers are voluntary policies, unsystematic and therefore difficult to compare. Today, there are serious concerns on initiatives related to the issue of food miles because they are considered as inappropriate tools to measure the environmental impact of food production and trade. Initiatives might have perverse effects when imported products are more energy-efficient than local products despite the distance travelled.

Conclusion

Food miles could become an even more important issue, as it concerns a growing number of consumers that are sensitive to the protection of the environment. However, there are many aspects, which are not clear because the measurement of its impact has to be resolved. The distance travelled by food commodities cannot be dissociated from the process of production, processing and distribution. The cumulative effects of the entire chain are more important than the effects of isolated factors such food miles. The question is how to reach a compromise between the demands of consumers, technical improvements and international policies.

On the other hand, the future depends on policies, roles and attitudes of local and regional authorities. Andrée Pasternak and Jean-Paul Pellisier[1] believe that we are now witnessing a decentralisation process in the southern and eastern Mediterranean countries. Policies should induce a greater interest in issues such as local food production and the protection of local producers taking their objectives and logistical improvements needed at this level into account.

Local authorities should work towards the recognition of the regional origin of their products, the establishment of an enabling environment and strengthening of "affectionate" connections between urban consumers and local producers. Urban

1 - See Chapter 27 of this Report.

consumers tend to forget the virtues of local varieties and breeds and give more importance to food imports because they are sold in modern facilities. However, farmers in rural areas should strive to improve the efficiency of agricultural production and their distribution.

Consumer satisfactions require a wide variety of products coming from different places. On the other hand, local produce should be promoted in order to preserve traditions as well as the income of local farmers. There is no policy that responds specifically to the issue of food miles, but this could be the case in the future and developing countries should be aware of this possibility.

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CHAPTER 26

AGROTECHNOPARKS: WORKING TOWARDS INNOVATIVE SYSTEMS

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Agrotechnoparks concentrate agro-industries, research and training institutions, input suppliers and providers of related services in one place and offer them dedicated tools to improve their performance and make innovation happen. They are a winning combination of applied research, technology transfer and training of specialised staff. Moreover, they provide a strategic infrastructure of support, logistics and related services and other factors that make a favourable environment for development, such as the possibility to negotiate trade agreements within and outside the region. This is why Euro-Med governments consider agrotechnoparks as one of the most effective ways to foster innovation in the agro-industrial sector. The Middle East and North Africa (MENA) region has been using this development tool over the past decade and many interesting experiences are currently underway or in more or less advanced stages of design and development.

In this context, this chapter provides an overview of agrotechnoparks in the MENA region and Turkey. It details the components, stakeholders and governance structures and provides an estimate of the costs, funding resources and expected impact. Options for the increase of Euro-Med cooperation for the development of agrotechnoparks are also explored.

Innovation in the Mediterranean agro-food industry

The Mediterranean basin[1] is an attractive market for almost 440 million consumers that spend a third of their income in food and beverages (Brun, 2012). Accordingly, the food and beverage industry ranks first in the national manufacturing sector in the majority of the Euro-Med countries analysed in Table 1.

1 - Only the CIHEAM member countries have been considered: Albania, Algeria, France, Egypt, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Turkey.

Table 1 - Importance of the food and beverage industry in the Mediterranean Area

	France	Egypt	Greece	Italy	Morocco	Portugal	Spain	Tunisia	Turkey
Net sales* (billion euros)	143.6	1.2	11.1	124	6.8	14	80.7	5.6	27.9
Number of employees (1,000)	470	500	66	406	92	109.6	445	63	471
Rank**	1st	–	1st	2nd	1st	1st	1st	1st	–

* Production value in current prices, year 2010 for France, Greece, Italy, Portugal & Spain, and 2008 for the rest.
** Rank of the food and drink industry in the national manufacturing industry in terms of sales.

Sources: Eurostat and FDE National Federations; "Brics and Beyond: Egypt Crisis Sparks Food Supply Jitters in Europe", *Just-Food* (www.just-food.com/analysis/egypt-crisis-sparks-food-supply-jitters-in-europe_id114136.aspx); Kingdom of Morocco, Ministry of Industry, Trade, Investment and the Digital Economy www.mcinet.gov.ma; National Institute of Statistics of Tunisia; Federation of Food and Drink Industry Associations of Turkey.

The northern shore has a strong and well-developed food industry which is the leading manufacturing industry in the European Union (EU) in terms of contribution to the Gross Domestic Product (2%), turnover (16% of industrial output), and employment (13.8% of manufacturing jobs) (FDE, 2012). Three Mediterranean countries – France, Italy and Spain – are among the five largest food and drink producers in the EU (FDE, 2011).

Nonetheless, over the past decade, the centre of gravity of the Euro-Med agro-food supply chain has slightly shifted towards the southern Mediterranean shore, as food and beverage companies have recognised the importance for the region in terms of cost benefits, the presence of strong logistical hubs and cultural appropriateness with the Arab markets. The increase in trade and cross-border investment in food and beverages has significantly changed traditional markets, consumer preferences and trading practices in the region. However, part of the change took place at national level. Many southern and eastern Mediterranean countries have intensified their commitment to agro-industrial development by implementing ambitious plans and strategies, such as Morocco's Green and Industrial Emergence Plans, Tunisia's National Industrial Strategy or Algeria's National Plan for Agricultural and Rural Development. The result is an impressive increase in added value in agriculture and food processing of over 5% in Algeria and Morocco and 3% in Egypt (Petit, 2013). Four countries of the southern shore differ in this respect: Egypt, Morocco, Tunisia and Turkey represent two-thirds of the sub region's agro-food production (CIHEAM, 2004).

Yet, the Mediterranean agro-food industry is facing structural challenges related to innovation, entrepreneurship and competitiveness. The European agro-food industry criticizes the lack of a sector specific industrial policy for the food sector, market fragmentation and bottlenecks in research and development (R&D). These problems

lead to a less-performing food supply chain, constrained by insufficient export expansion, limited access to finance (particularly for SMEs) and a relatively high unemployment rate (FDE, 2012). Mainly composed of small enterprises with low and medium technology, the food and drink sector of the southern Mediterranean shore is constrained by several factors including lack of innovation and finance shortages and lack of leadership.

The competitiveness and innovative capacity of the Mediterranean food industry are currently affected by the global economic crisis, the aftermath of the Arab Spring and repeated food price surges. These shocks have caused a credit crunch, a collapse in consumption and a loss of export competitiveness. In this context, it is more imperative than ever to strengthen the sector's capacity to innovate. This can be achieved through the promotion of agrotechnoparks, i.e. structured and well-established agro-food communities to promote innovation by bringing together in one place, the necessary actors (agro-industries, research and training institutions, and input suppliers and related services) and the dedicated tools for innovation (FAO, 2011). These parks provide a favourable environment for investors with the necessary infrastructure, logistics and social facilities. Investors also benefit from the valuable contribution of applied research, technology transfer and training of specialised staff.

Regional innovation policies for agro-industrial development

In an increasingly knowledge-based and innovation-driven economy, improving agro-industrial competitiveness and adapting to the meta-trends that change the agro-food landscape necessarily involve research, development and transfer of technology (Deloitte, 2012). This is why Euro-Med agro-food companies focus on innovation in products (very often variations of taste and packaging) processes and organisational structures. Process innovations maximise the profitability of production and distribution systems (Traill and Grunert, 1997), integrated food chain control, processing line automation and climate change adaptation strategies. Finally, organisational innovations include agrotechnoparks, food technology transfer networks and "food valley" approaches aimed at enhancing innovation and knowledge transfer both from one firm to another and from universities and research centres to agro-food companies (EC, 2007).

In terms of innovation, the food industry differs from other manufacturing sectors. Firstly, innovation in this sector typically follows a demand-pull model, in the sense that market needs (and not science) induce innovation (Clark and Guy, 1997). This makes innovation in the food sector more process, marketing and management oriented, focusing on topics such as food chain management, health issues and changes in consumer preferences (EC, 2007). Secondly, the food industry adopts and adapts to basic innovations quicker than other industries such as logistics, information and communication technology (ICT) and marketing (ibid). Lastly, innovation in this industry is often limited by restrictive food safety regulations, the rather conservative attitude of consumers with regard to diet, long authorisation procedures and cost factors.

These characteristics partly explain the deficit in innovation recorded in the Mediterranean agro-food industry when compared to other manufacturing industries but also in relation to food industries in other parts of the world. This is certainly true for two key indicators of innovation: business expenditure in R&D (e.g. 0.49-0.53% of the total turnover for the EU) and patent applications (2-3% of total EU patent manufacturing applications in 2008) (FDE, 2012). Nonetheless, the capacity of the food industry to rapidly assimilate innovations from related industries makes it pointless to compare it to other industries by using data on patents and R&D investment. Especially since the industries on both Mediterranean shores are separated by a large gap in innovation.

There is much that Mediterranean governments can do to help food companies increase their innovation potential and bridge the existing gap. This support can take the form of direct support to R&D or indirect measures such as tax credits that reduce the cost of R&D and allow agro-food companies to choose which projects to fund (OECD, 2010). The use of a particular measure will depend on the nature of the tax system, labour market and the entrepreneurial approach in each country. The governments of the Euro-Med region have introduced three kinds of pro-innovation policies: 1) "facilitation policies" that create a favourable environment for growth and innovation; 2) "traditional policies", i.e. sectoral policies unrelated to the territorial dimension that influence innovation in the agro-food industry such agriculture, industry, SMEs, trade, and R&D policies and 3) "development policies" that support territorial development initiatives in the agro-industrial sector (e.g. agrotechnoparks) with a recognised impact on innovation. These three types of policies can coexist and this is usually the case.

The EU has established relevant frameworks for innovation policies (2010), agriculture and industrial competitiveness (2010). It has also closely associated innovation and SME support – over 99% of total Mediterranean food companies operating in the agro-food sector are SMEs (FDE, 2012) – in the Entrepreneurship 2020 Action Plan. This Plan aims at making the principle of "think small first", a cornerstone of innovation, growth, industrial and agricultural policies. An interesting example of EU pro-innovation instruments targeting SMEs is the Enterprise Europe Network[2], which has a specific group for agro-food issues that helps European SMEs to identify innovative solutions for product development. The EU countries have access to R&D funding under the EU Seventh Framework Programme for Research (FP7), which has a budget of 1.9 billion euros for research initiatives in the food, agriculture and fisheries, and biotechnology industries (EC, 2009). Within the FP7, Activity 2.2 "Fork to farm" focuses on health and consumers, nutrition, food processing, quality, safety and traceability as well as the impact of climate change on and through food and food chains.

In terms of development policy, the European Regional Policy Programme 2007-2013 should be highlighted. It promotes an approach based on innovative clusters and technoparks through a growing number of national initiatives supported by Community instruments (EC and OECD, 2008). This programme comes from a long tradition of industrial policies deeply rooted in regional contexts and based on the concept of competitive areas in the food industry. Although they have various names, these approaches (e.g. the French "pôle de compétitivité"; the British "centres of

2 - Enterprise Europe Network (www.enterprise-europe-network.ec.europa.eu).

excellence" and German "industrial regions") share the same principles, since the idea is always to apply bottom-up policies involving regional, industrial and technological dimensions to stimulate innovation, attract agro-industries that are being relocated and avoid relocation.

Egypt, Morocco, Tunisia, Turkey and other countries in the region have recently launched a new generation of programmes to enhance agro-industrial competitiveness and food security. Most of them focus on agrotechnoparks and other devices to concentrate agro-food activity and promote innovation. The policy of concentration of small agro-industrial firms including agrotechnoparks that are one of the best examples, is justified by a domestic food industry configuration that requires scale economies and externalities linked to the participation of foreign capital (World Bank, 2009). Furthermore, these countries strive to build a new identity, to position themselves on the global agro-food map, gain in competitiveness and climb up the value ladder. Such repositioning relies on technology and innovation in agro-industry to generate a breakthrough in optimising its processes, taking advantage of lower production costs and fully adopting international standards.

Although independent agro-industrial policies are rare, strategies often include elements related to improvement of the capacity of the food industry to compete and innovate. Most often these elements also promote agrotechnoparks. Morocco has two plans for agriculture (Green Morocco) and industrial development that seek to develop 15 flagship technoparks, some of which will be dedicated to the processing of food and fish products (Kingdom of Morocco, 2007 and 2008). These plans also provide a solid framework to coordinate the various innovation programmes and instruments that Morocco has established: technoparks, knowledge and technology transfer networks, business incubators, innovation awards, industrial technical centres, agro-industrial guarantee schemes and awareness-raising and matchmaking events (European Communities and OECD, 2008).

Tunisia has implemented a range of policies focusing on innovation including the Industrial Modernisation Programme (1996), laws on techno parks (2001) and clusters (2006), the Industrial Modernisation Programme (2003), the National Industrial Strategy of Tunisia (2008), and the "Think Tunisia" investment promotion initiative (2009). Currently, Tunisia is embarking on a strategy of aggressive innovation featuring a wide range of programmes and tools, including the National Plan of Tunisian Technoparks Network, coordinated by the National Agency for the Promotion of Research and Innovation (EIB *et al.*, 2010).

The Algerian Government has adopted a National Industrial Strategy and a Strategic Planning Scheme 2025 (MATE, 2007) that include a technopark programme for 2010-2014. The creation of twelve new parks, comprising an agrotechnopark in Bejaia, and the modernisation of pilot technoparks developed in the 2000s are also envisaged (European Communities and OECD, 2008). Turkey's agro-industrial policy framework draws elements from the Agricultural Strategy (2010-2014); the Industrial Strategy (2011-2014); the Strategy for Natural Sciences, Technology and Innovation Strategy (2011-2016), the National Long-Term Strategy (2001-2023), and the National Programme for the Adoption of the EU acquis (2007-2013). Turkey has adopted the technopark

approach in the mid-1990s, but it was little applied to the agro-food sector. Finally, Egypt's innovation ecosystem is rich, with many entities and programmes supporting innovation activities, but food technoparks were not part of it until recently (STDF, 2012).

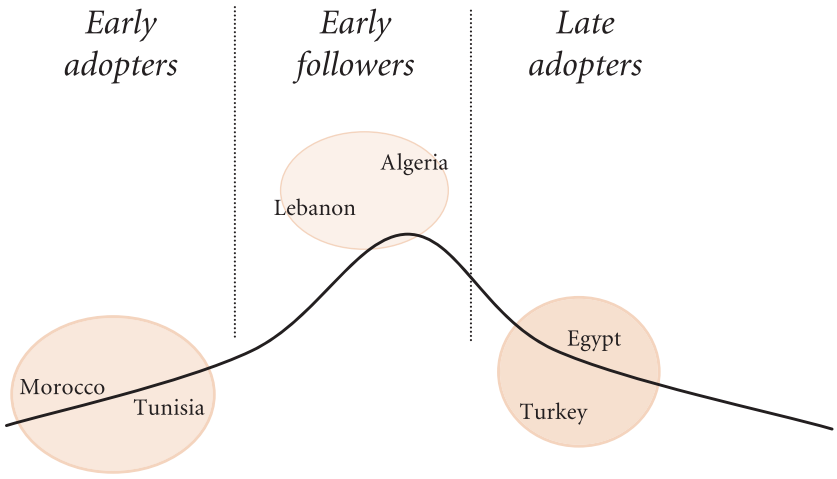
Overview of agrotechnoparks in the Euro-Med region

The functioning of agrotechnoparks and their innovation potential is based on a strong economic and technological foundation. When food companies operate together in a technopark, they benefit from agglomeration economies and networking effects. The more agro-food firms cluster in a park, the less the costs of production are because it becomes easier for them to attract more suppliers, service providers, qualified workforce and customers (FAO, 2011). Moreover, agrotechnoparks provide an enabling environment for innovation, especially for SMEs, providing them with the opportunity to collaborate with research and training institutions, suppliers and competitors therein, and by encouraging them to work together on a joint roadmap for innovation. Agrotechnoparks allow them to overcome existing market failures (e.g. coordination failures, information asymmetries and dependencies) and shortages of funds, by creating a critical mass for innovation, R&D funding, capacity building, cross-fertilisation of ideas, and entrepreneurial initiatives. Park tenants therefore benefit from territorial learning and technological/knowledge spinoffs (EC, 2010).

Eastern and southern Mediterranean countries started to timidly use technoparks and other territorial approaches to promote food "competitive areas" in the 1990s. In the mid-2000s these notions became mainstream in the regional agro-industrial agendas (Abis *et al.*, 2009). Examples of agrotechnoparks from this region are presented in Table 2.

The above-mentioned countries can be classified in three categories depending on how much and how well these countries have applied the technopark strategy to their agro-food system: early adopters, early followers and late adopters (see Figure 1).

Figure 1 - Adoption curve of the agrotechnopark approach in southern and eastern Mediterranean countries



Source: FAO (2011).

Table 2 - Examples of agrotechnoparks in the Mediterranean region

Country	Location	Sectoral/subsectoral focus	Surface (ha)	Year of establishment
Morocco	Meknes Agropolis, Meknes-Fez	Horticulture, olive oil, milk, cereals and red meat	450	2005
	Oriental Agropolis, Berkane	Citrus, olive oil and vegetable chains	100	2009
	Souss-Massa Agropolis (Agrotech), Agadir	Horticulture and citrus value chains and *produits du terroir* (e.g. dates, saffron, prickle pears and honey)	–	2006
	Tadla Agropolis, Tadla-Azilal	Olive, citrus, vegetables, milk, red/white meat	150	–
	Gharb Agropolis, Kenitra	Olive, citrus, vegetables, milk, red/white meat	–	–
	Haouz Agropolis	Olive, citrus, vegetables, milk, red/white meat	–	–
	Haliopolis, Agadir	Fish processing	150	2010
	Dakhla-Laâyoune	Fish processing	–	–
Tunisia	Bizerta	Seafood and canned fish, dairy and cheese, potatoes, wine, and cereals and derivatives	87	2006
	Jendouba	Arable crops and livestock	–	–
Algeria	Bejaia	Food processing	–	–
	Sidi Bennour	Food processing	51	–
Lebanon	SouthBIC, Saida	Food processing	–	–
	Bekaa	Food processing and agro-tourism	–	–

Source: MITNT (2010).

Tunisia and Morocco are among the early adopters, i.e. among the first five to have created agrotechnoparks as part of their programmes to modernise and upgrade the industry. Morocco has eight agrotechnoparks (see Table 1) that are operational or under development. Tunisia has two in Jendouba and Bizerta, which is rather advanced. Algeria and Lebanon are early followers since they have only a few agro-technoparks that are still in draft form (Lebanon) or in start-up stage (Algeria).

Egypt and Turkey can be considered as late adopters as agrotechnoparks are almost inexistent there, although they have advanced technoparks in other sectors, particularly ICT, electronics and business process outsourcing. In Turkey the idea of developing agrotechnoparks is gaining ground and the government is working to transform the multidisciplinary park in Mersin into the first Turkish agrotechnopark.

Design and implementation of agrotechnoparks

Agrotechnoparks provide their tenants with infrastructure including hardware and software investments, serviced land and quality services (e.g. administration, logistics, premises, telecommunications, catering, labelling, laboratory, marketing, communication and event organisation, certification and auditing and financial services), as well as access to specialised research, training and coaching (FAO, 2011).

Agrotechnopark components

There can be several distinct areas dedicated to processing, logistics platform, R&D, training, and technology transfer, business incubators, service areas and other common facilities (see Table 3). R&D areas are present in all cases, although some are more developed than others. The idea behind this structure is to further the cross-fertilisation between research institutions, universities and industry, and foster the establishment of local or international private companies (case of Algeria).

Agrotechnoparks often offer their tenants financial investment or market incentives. In particular, export promotion incentives coupled with the negotiation of preferential trade agreements can be decisive factors in the performance of the park. However, incentives may be ineffective if the environment has not been studied in order to promote the private sector's adoption of an integrated approach and its involvement in agrotechnoparks and inclusiveness. Governments should be able to promote the participation of SMEs while forging pro-innovation alliances with large corporations.

The development of agrotechnoparks in the region is linked to investments in infrastructure and logistics, particularly airports, motorway links, railways and high-capacity ports such as Tangiers-Med Port (Morocco), and those that are being planned in Enfidha (Tunisia) and Cap Djinet (Algeria). Creating a favourable climate for private sector investment is also essential for the success of agrotechnoparks, which cannot be conceived without the existence of well-oiled public institutions and a regulatory framework ensuring the market's proper functioning (e.g. market regulation and information systems, financial institutions and risk-management tools), the protection of property rights to land and water in order to motivate private investments in agro-industry, especially longer-term ones, and the development and application of the necessary social and environmental measures (FAO, 2011).

Table 3 - Key agrotechnopark components and services offered

Country	Location	Components					
		Industrial area	Logistics platform	R&D area	Business incubator	Business service centre	Other
Morocco	Meknes Agropole	X	X	X		X	
	Berkane Agropole	X	X	X		X	
	Agrotech	X		X	X	X	
Tunisia	Bizerta	X	X	X			(Agrotech knowledge network)
	Jendouba	X		X		X	
Algeria	Bejaia	X		X	X	X	X (Single desk for investors)
	Sidi Ben	X		X	X	X	
Lebanon	SouthBIC	X		X	X	X	
	Bekaa	X		X	X	X	

Source: Author's elaboration, based on FAO (2011).

Stakeholders and governance

Ideally, the development of agrotechnoparks should begin with consultations with all stakeholders. The design and implementation of the Moroccan parks presented were preceded by extensive consultations with universities, research centres, Moroccan companies and subsidiaries of multinational firms operating in the country. Techno parks are often owned by the government although in some cases (Egypt and Morocco) the property is shared with private entities. All this requires the good coordination of inputs, responsibilities and rights of all stakeholders and the establishment of a legal framework and financial package that meets their needs and concerns. It is becoming increasingly common to create a formal structure around the techno park's assets (i.e. facilities) and liabilities (debts) and to implement some form of operation and maintenance mechanism to manage the techno park's shared facilities. This mechanism combines the decision-making power to the membership of the agrotechnopark, while the responsibility for managing the process is outsourced to private-consultants or a specialised firm resulting from a public-private partnership (PPP).

Examples include the Agadir technopark managed by Parc Haliopolis Societé, a PPP between the Souss-Massa-Drâa region, Igrane Fund, Crédit Agricole and MedZ and Agrotech, run by the Association Agrotechnologies Souss-Massa-Draâ, with representatives from the regional council, other local and national authorities, professional associations, financial institutions, training and research institutes and private firms.

Box 1: A pioneering initiative: the Bizerta agrotechnopark in Tunisia

In the 1990s, Kamel Belkahia dreamed of creating a centre of agricultural competitiveness in Bizerta with his entrepreneurs working in the same sector. His dream took a while to materialise. In 1998, feasibility studies for the pole/park were carried out. The firm entrusted with the management of the park was created in 2006 as a PPP company that adopted the legal status of a science park linked to a specific economic zone. In 2011, the Tunisian Ministry of State Property and Land Affairs signed a land concession agreement with the PPP company of Bizerta and the construction of the park started at Menzel Abderrahman, a few kilometres south of Bizerta.

The park was launched using a bottom-up participatory approach that involved consensus and consultations with leading operators and key institutions while ensuring coherence with the strategic analysis of the agro-food sector and the orientations of the Ninth Tunisian Plan.

The park includes an industrial area (150 ha) and an area dedicated to innovation and knowledge (45 ha). In this R&D area, there are 18 research and training institutions with 2,300 researchers managing demonstration centres, a technology watch unit, an innovation and technology transfer centre and a training centre. The agrotechnopark is strategically located in the vicinity of Tunis, close to the Carthage airport, the commercial port of Bizerta and the free zone surrounding the Bizerta Lake. In February 2013, the park included 30 partners, 7 foreign firms and over a 100 domestic companies. The park covers 5 agro-food chains (wine, potatoes, dairy

products, seafood and canned fish, and cereals) out of the 9 chains identified as priorities by the national agribusiness development strategy. With an overall investment of 150 million euros by 2020, the park is expected to accommodate 170 businesses and create 9,000 jobs. The park has cooperation agreements with two French agrotechnoparks (Q@alimed-Montpellier and Agroparc-Avignon) and the free zones of Cadiz (Spain) and Jebel Ali-Dubai (United Arab Emirates). It receives support from the EIB (positioning & marketing study), the CIHEAM and the Tunisian National Agricultural Institute, which jointly offer a Master in Management for park tenants.

Sources: FAO (2011); Abis (2013).

Agrotechnopark managers generally receive technical assistance from consultants, donors, and specialised platforms such as Agropolis International, a platform for knowledge specialised in agriculture, food, biodiversity and environment, based in Montpellier (France). The same platform provided technical assistance for the establishment of Agrotech. Some governments in the region have promoted the creation of a national agency for the coordination, design, implementation and/or monitoring technoparks. This is the case of the National Agency for the Promotion and Development of Technology Parks in Algeria or the Council for Technology and Techno parks in Turkey.

Furthermore, agrotechnoparks can be linked to several existing networks at national, regional and international levels to create synergies, to make transfers of knowledge, to develop commercial relationships, and to enhance their ability to innovate and their market position and promote their internationalisation. One of the most important regional networks is ANIMA, a platform that brings together several countries and promotes networking among agrotechnoparks and other relevant actors in the Mediterranean region. Internationally, there are two main meta-techno parks networks: the International Association of Science Parks (IASP) based in Spain and the World Technopolis Association (WTA) based in Korea. IASP is a non-governmental organisation that enjoys a Special Consultative Status with the Economic and Social Council of the United Nations (FAO, 2011).

Financial Aspects

Estimated costs, funding sources and the expected impact vary considerably from one park to another. In the case of Morocco, agrotechnoparks are expected to generate additional sales volume of 361 million euros and create 16,000 new jobs (Abis *et al.*, 2009). The Meknes-Fez agrotechnopark cost 440 million euros and is expected to create 11,000 jobs, whereas the Berkane park cost 200 million euros and aims to generate 5,000 jobs. Agrotech has a smaller profile, with a total investment of 9 million euros and an employment target of 400 direct jobs.

Agrotechnoparks are mostly financed by public funds that have a leveraging effect on private investment. Some parks may fail to attract the target level of private investment due to lack of publicity and awareness among potential investors. The interest and participation of stakeholders are therefore necessary to the success

of agrotechnoparks. Moreover, public funding rarely achieves the objectives and this is quite paradoxical given that techno park promotion mechanisms usually include fiscal incentives. In some cases, to overcome this, additional funding comes from international banks. For instance, the European Investment Bank (EIB) provides financial and technical assistance to Tunisia for the development of five techno parks.

Agrotechnoparks are a major investment (10 million euros and more plus related infrastructure) over a long time (10-20 years), from conception to maturity. The earlier adopters in the region, such as Tunisia and Morocco, started talking about agrotechnoparks in the 1990s and almost two decades later, they are still investing a significant amount of time and financial resources to maintain their operational level. Therefore, it is essential to determine, through feasibility studies and business plans, whether the conditions to attract tenants exist and whether adequate financial and human resources will be deployed. Additionally, the cost and the opportunity to promote agrotechnoparks must be considered vis-à-vis other possible innovation measures in the food industry.

Mediterranean cooperation for the development of agrotechnoparks

The EU has established several lines of bilateral and multilateral cooperation to support techno parks on the southern shore of the Mediterranean. Some examples of this are the bilateral agreement on training (2009) between France and Tunisia and the protocols designed to strengthen relations between French and Tunisian universities and technoparks/clusters in the food, textile, new technologies and transport sectors.

Multilateral cooperation is more common. Two multilateral projects, *Medibtikar* and *Invest in Med/Med Ventures 2010*, should be highlighted. *Medibtikar* (the name derives from Mediterranean and Ibtikar, Arabic for Innovation) is a 7.3 million euros-EU programme that from 2006 to 2009 supported public organisations and private firms wishing to increase the competitiveness of SMEs in several eastern and southern countries. One component of *Medibtikar* focused on techno parks and business incubators. The programme included several actions aimed at increasing networking between eastern and southern countries, and with their European counterparts, facilitating dialogue between techno park and incubator managers, project holders and donors, establishing a framework of local experts able to reproduce the training/technical assistance adapting it to local conditions and raising awareness on the importance of innovation in the research and academic communities (Yates and Woodham, 2010).

Invest in Med is a 9 million-euro budget project to establish a Euro-Mediterranean network of organisations working for the promotion of investment and trade facilitation and collaboration and exchange of best practices among SMEs. It aims to strengthen Mediterranean Investment Promotion Agencies (IPAs), and to reinforce cooperation with their European counterparts. *Invest in Med* launched *MedVentures*

in 2010, a competition for the 100 most innovative start-ups in Mediterranean partner countries. *MedVentures* 2010 aims at creating new economic leaders in the region by connecting the most promising entrepreneurs with sources of financing, techno parks and innovation networks, networks encouraging talent and mentoring. It is also developing new dynamics of innovation by mobilising key stakeholders around entrepreneurs and their business projects and developing focused and coordinated actions at Euro-Mediterranean level.

Finally, there are several examples of decentralised Euro-Mediterranean cooperation that can be grouped in three categories: 1) "Twinning" of Euro-Med technoparks, as in the case of Bizerta with the French parks of Q@limed-Montpellier and Agroparc-Avignon; 2) Strategic alliances between parks and European-based agro-food firms: for instance, Tunisian technoparks cooperate with international private partners from France, Germany and Italy that provide high-value services to their tenants; 3) The links between universities to support technoparks (European Communities and OECD, 2008).

Conclusion

On the one hand, almost all the recent agro-industrial policies in the southern Mediterranean countries consider agrotechnoparks as one of the new driving forces for innovation, growth, generation of knowledge and investment. Such policies are bottom-up (they create a framework for collaboration between local and central public agencies), multidimensional (embracing agricultural, industrial, innovation, trade, transport and logistics, and regional policies) and focused on institutional innovations to reach a critical mass of interrelated stakeholders. On the other hand, significant differences between countries in terms of size, industrial experience, resources, economic and political system, skills and capacities of government do not allow the adoption of a one-size-fits-all approach.

Agrotechnoparks can generate and disseminate innovation, because they reduce transaction costs and facilitate collaboration among agro-industries, and research and academic institutions. The majority of agrotechnoparks in the region are of the "technology-push", type i.e. focused on technology driven by universities and research institutes interacting with the food industry. However, there are a number of parks that meet market demand and where the innovation agenda is guided by food industry associations and chambers of commerce (EIB *et al.*, 2010). In both cases, agro-food firms located in techno parks are more likely to conduct market research, to introduce innovative products and new production technologies and submit their innovations more often than other businesses (EC, 2010). However, since agrotechnoparks are still very recent in southern Mediterranean countries and given the lack of experience, it is difficult to accurately quantify the impact of agrotechnoparks on innovation in the food industry. Most of the parks presented in this chapter deal with high-value, export-oriented agricultural products such as olive oil, fish, meat and fresh fruits and vegetables. They may therefore have a limited effect in the fight against soaring prices of grains and other staple foods. Nevertheless, techno parks have succeeded in improving employment levels, increase wages and

tenant profits, thus improving the ability of the area's inhabitants to purchase food. Their food security therefore increases.

Agrotechnoparks are important means to attract foreign direct investment (FDI) through a combination of tax concessions, reduced rates for access to public services and investment in infrastructure, logistics and R&D. Countries where agrotechnoparks are relatively more developed (Morocco, Tunisia and Algeria) have managed to channel 2% of total FDI in the food sector (for 2003-2009), mainly for agro-industrial processing, food retailing and supply of input (Anima, 2009). As agrotechnoparks are becoming increasingly organised, new tools to develop an ecosystem around them are emerging. As a result, these parks are increasingly being integrated into broader innovation and territorial development (e.g. agro-corridors) plans. Ultimately, achieving world-class Euro-Med agrotechnoparks requires the alignment and coordination of the different national strategies towards a more cohesive approach. This entails the creation of appropriate framework conditions, i.e. establishing effective governance mechanisms (building effective and inclusive institutions with organisational continuity) and engaging in networking and collaborative efforts at country, Euro-Med and global levels.

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CHAPTER 27

TRANSPORT AND LOGISTICS: TERRITORIAL ISSUES AND THE ROLE OF LOCAL AND REGIONAL AUTHORITIES

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The history of the Mediterranean shows that transport and logistics have always been a tool for economic development, enhancing territorial structuring and cohesion. As a result of trade liberalisation, transport and logistics have become a key element in the competitiveness of goods on international markets. Eminently competitive, this sector, albeit private, also relates to spatial planning policies, be they regional, European, Mediterranean, or national policies. Regional and local authorities are taking a keen interest in the major infrastructure projects supported by the European Union. Their interest stems from their wish not to be isolated or excluded from future key arteries.

By linking territories to one another, and by organising themselves into "platforms" located at strategic nodes in dense networks that are becoming increasingly complex and segmented, logistics and freight transport infrastructures necessarily raise the question of the actual or potential role that local authorities play in the dynamics of "more, faster, further". Goods, be they inbound or outbound, are like a river; territories divert part of the course of this river for their benefit. Competition between territories to tap into this economic flow is a fact; the benefits that ensue should be weighed against the negative externalities that are generated (traffic congestion, health risks, noise, pollution, etc.).

However, where stakes are supra regional in scale, the individual territorial interests driving regions to compete among themselves disappear in favour of joint actions that are proof of how important regions have now become in political decisions. The transport sector is no exception to this.

On top of these aspects, which help territories to establish themselves firmly on the main arteries of commerce and international competition, comes another dimension, one that originates in the idea of "local regeneration". In response to new social demands or in reaction to some of the excesses of globalisation, more and more local and regional authorities are promoting development strategies that uphold local development of the local economy, by and for locals. Such an approach requires specific logistics and means of transport that, in turn, become central to the successful implementation of these new local strategies. Just as there are alliances of convenience among regions with regard to international trade, alliances may also be forged at local levels on issues that may give rise to new governance arrangements for the flow of goods or that may even determine a particular type of organisation. It thus becomes clear that the strategies undertaken by local and regional bodies in the field of transport and logistics are rich and diverse, combining local initiatives, response to competition, inter-territorial alliances, networking, lobbying, and so on.

In discussing the role and place of local and regional authorities in the governance of transport and logistics, this chapter endeavours to shed light on the various levels of intervention in a sector that reflects the current economic organisation, but in which it is also possible to identify the beginnings of new forms of organisation and governance. In areas where the notion of territory does not apply, as is still often the case in countries south of the Mediterranean, the lack itself of any local and regional authority may be a source of further information.

Box 1: Local and regional authorities

In this chapter, the term "local and regional authorities" refers to different levels of decentralisation (municipalities, districts, provinces, regions, etc.). The term "regional and local bodies" will also be used. In countries where decentralisation already exists, the authorities have their own competencies, staff, budget, and legal safeguards that regulate their existence.

On the southern shore of the Mediterranean, there is, generally speaking, an increase in the transfer of power from central bodies to the periphery. However, this transfer is not always accompanied by the necessary resources or by sufficient means of financial management (UCLG, 2008). In the North, the competencies of local authorities and of regional bodies in particular vary widely from one country to another depending on the degree of federalism of each.

Local and regional authorities and the structuring of international trade routes and logistics

Private stakeholders in the transport and logistics sector, as well as in upstream and downstream sectors, are the primary driving force behind the organisational dynamics and the permanent reshaping of the traffic and distribution networks of goods – they mobilise technical progress, and optimise costs through clustering or segmentation of activities.

Regions are actively involved in the structuring of international trade routes

Intercontinental flows of freight link the major ports of the world together. Ports are gateways from which internal transport routes and logistics nodes develop on whole land territories[1]. Being, becoming or remaining one of these nodes, through modernisation, adaptation or innovation constitutes an important challenge for local bodies in terms of their economic development, be it in their capacity to serve as platforms for the circulation of goods, or meet the supply needs of local industries, or become more competitive in the export of local goods. Consequently, the development of transport and logistics infrastructure is an integral part of the strategies developed by local and regional authorities to enhance the attractiveness of their territory. Regions can thus invest in port facilities (equipment, amenities) to make them more competitive. Because the sphere of influence of a port and its economic attraction cover the hinterland, it is necessary for the region to improve its environment by developing connectivity, promoting alternative modes of transport and by often opting for complementarity with neighbouring regions. Local and regional bodies are proactive when it comes to encouraging the development of transport and the establishment of logistics platforms; they are also in a position to promote innovation in this field and favour the development of certain modes of transport or certain logistical modalities which consume less energy and are less polluting.

It can be observed that, where regions do exist, they participate in the territorial organisation of transport and logistics. They do this in different ways, depending on their competencies: they may co-finance investment programmes together with the state or the private sector, or organise land management in such a way as to ensure optimum development of logistics infrastructure; they may promote innovation, or develop policies to attract actual and potential investors. They may also act as a driving-force or federator among local stakeholders for medium-term development plans and strategies, or help this sector to become fully integrated in other territorial dynamics. The increase in territorial value most certainly needs to be sought in the last two points, particularly at the regional level, with reference to state approaches which are more centralised and those of private operators which are more self-reliant.

In France, regions work together to devise regional transport plans, regional infrastructure and transport plans, regional port strategies etc., all of which are designed to "provide transport and logistics professionals with clear guidelines about future directions, while ensuring coherence in the development of equipment and infrastructure" (Languedoc-Roussillon Region, 2009). The aim is to develop the regional territory and make it competitive.

The Port of Rouen has thus benefited not only from the support of the Upper-Normandy region[2], but also from the support of the city and the department. It is currently the largest French port for the agro-industry, particularly for cereal export

1 - For a view of the density of the major shipping routes, please refer to the World Bank's map (2009, p. 172).

2 - The Upper-Normandy region has the largest French port complex and the fourth largest in Europe with two major ports, Le Havre and Rouen, thanks to a multimodal network. The Maghreb is the top export destination and represents 60% of exports, outstripping the Near and Middle East, West Africa, the EU and Central America.

(wheat, barley, maize), with Algeria as top destination (wheat and barley), followed by Morocco. However, if the port of Rouen is playing a key role today, it is because it is relayed by a road network and an extensive rail infrastructure. By emphasising these assets, the region succeeded in developing a multimodal complex: it promoted complementarity between the ports of the Lower Seine and made a place for itself in a corridor of river and rail freight. Local authorities in the region have favoured cooperation and the promotion of all forms of transport in order to strengthen the economic weight of the logistics sector and develop the local economy.

The situation of the port of Marseille-Fos provides indirect insight into the importance that local authorities and strategic dialogue have when developing a competitive network that combines transport and logistics. Like six other ports in France, including that of Rouen, the port of Marseille-Fos is a major autonomous port[3], controlled by the state. Its relatively weak performance, analysed in a recent OECD study (Merk and Comtois, 2012), indicates that lack of local governance may be one of the factors behind this situation: "First, ports that are state-controlled could be less sensitive to local concerns (creating local economic value and jobs, reduction of environmental impacts) than ports owned by city or regional governments. Second, port-cities that are not in charge of their ports could be less inclined to create favourable conditions for sustained port development, such as investments [...]" (Merk and Comtois, 2012). If "one euro of new demand within the port cluster leads to one additional euro of supply in the French economy" (Merk and Comtois, 2012), in the case of the port of Marseille, the main beneficiaries are the regions of Île-de-France and Rhône-Alpes (30%), far outstripping the Provence-Alpes-Côte d'Azur (PACA) region (only 6% of this additional euro goes to local economy). In light of this observation, Bernard Morel's reaction to the release of the OECD study in November 2012 was reported to be: "What is the point of developing and investing in the port? There is a real problem when it comes to docking the port and the economic activity[4]." Bernard Morel is Vice-President of the PACA region and in charge of economic affairs. Undoubtedly, the disaffection of the region for its port has its own repercussions on international competitiveness and on the region's capacity to attract flows of goods, particularly agricultural products.

Cities and conurbations at the heart of urban logistics

At the micro-local level, cities and urban communities play a major role in the configuration of networks and positioning of logistics infrastructure. The aim is twofold: access to the city should be organised in such a way that residents and businesses alike are served; yet, the "last mile", which represents 20% of the total cost, needs to be kept in mind. Although city authorities do not have competence in freight, it is their responsibility to choose the best locations for storage areas and optimise the flow of goods to ensure that shops are well supplied. However, they are also responsible for restricting, by regulation if need be, congestion in urban

3 - In French, the term "ports autonomes" refers to portsœwhich are operatedœas commercial and industrial state-run bodies (translator's note).

4 - Nathalie Bureau du Colombier, "Un rapport de l'OCDE pointe du doigt les déficiences du port de Marseille", *Econostrum.info* (www.econostrum.info).

centres and transport-related nuisances. There is a growing awareness as to the importance of logistics and urban freight transport.

Thus, as a result of a study done by an urban planning agency and commissioned by the city of Marseille in 2010 (AGAM, 2010), five major goals were identified: acting on regulations concerning the delivery of goods, adopting a proactive policy in favour of land preservation, fostering the development of a new generation of logistics infrastructure, promoting a new logistics organisation, supporting new ways of cooperation between stakeholders and innovative modes of transport. Furthermore, proposals for development strategies were submitted for all four areas identified as making up the spatial organisation of the city (the city centre core, the sub-central area, the northeast area and the peripheral area).

In a recent CIHEAM Briefing Note referring more specifically to the issue of the "last food mile" (Morganti, 2013), Eleonora Morganti emphasises the key role that cities could be led to play in a holistic approach that addresses the question of urban food supply together with issues such as health, land allocation, economic development and environmental conservation. As we shall see later on in this chapter, urban logistics are becoming an important issue in new strategies for the relocation of local economies, and could ultimately affect the overall organisation of the transport and logistics chain.

In the southern and eastern Mediterranean, centralisation is still going strong

The Southern and Eastern Mediterranean Countries (SEMCs) lag far behind in terms of transport and logistics infrastructure. The sector is dominated by road transport, and is concentrated along the coast; because of the lack of urban and rural transport infrastructure, the major urban areas are congested. Local authorities are only loosely structured and have no real autonomy; consequently, the whole organisation of this sector is still largely dominated by the public sector. Partnerships with private operators are becoming more and more prevalent in the shape of "programme contracts" or through agencies acting under state supervision. Thus, in Algeria, port management has been entrusted to regional public institutions, called "port authorities", which have legal personality and financial autonomy. In Morocco, the Moroccan Agency for Logistics Development (AMDL), founded in 2011, is the strong arm of the state when it comes to the implementation of the integrated national strategy for development and logistic competitiveness (Morocco, 2010). It brings together all the parties involved: administration, local authorities, and economic stakeholders. It has legal personality and financial autonomy, and operates under state supervision. The development of the port of Tangiers was entrusted to another agency, the Tangiers Mediterranean Special Agency (TMSA). The TMSA is a public limited-liability company, which is directly controlled by the state and is endowed with the power of a public regional authority on the area concerned. The development of the hinterland, on the other hand, falls under the responsibility of the Agency for the Promotion and Development of the North (APDN). Founded in 1996, the ADPN was the first national development agency dealing with local issues[5].

5 - For an analysis of Morocco's logistics strategy, please refer to Abis (2013).

The primary objective in these countries continues to be the development of a national network of interconnected logistics platforms linked to international flows, primarily through land market liberalisation or the mobilisation of land reserves belonging to the state. In Morocco, development agencies, such as the APDN, which are public institutions attached to the Prime Minister and enjoying financial independence, develop a strategic vision for the future of their territory and invest directly in the realisation of infrastructure permitting regional interconnection, much in the same way as regional bodies that have "full authority". The APDN promotes various projects, such as the construction of the Mediterranean bypass that links Tangiers and Saïdia, thus reducing travel time between the two cities from eleven to seven hours. Other projects include improving the existing road network and, above all, constructing roads and village tracks to structure the area that lies right behind the port of Tangiers Med. To date, the synergies between the region and the agency are not optimal; however, thanks to the experience that it has acquired over the past two decades, APDN is emerging as an important vector for capacity building and for the transfer of functional expertise to regional and local authorities within the process of advanced regionalisation. Although no real territorial strategy exists yet to complement the national approach to transport and logistics and to refine the impact that this approach has on a local level, it can be assumed that regionalisation will provide the "missing link" in the years to come.

Turkey provides yet another very good example of these dynamics. Strategically positioned between Asia and Europe, with a great economic potential thanks to its booming export industry, and embarked on the process to join the EU, it has recognised the need for a transport and logistics infrastructure scheme that measures up to these two challenges, hence the creation of a network comprising seventeen regional "logistics villages". Yet again, the state is the main protagonist alongside private stakeholders; local and regional bodies have still to grasp the significant role they could play in this momentum, which will necessarily affect local communities.

Local and regional authorities forge alliances to assert regional interests

Europe and its member states have now realised both the economic importance of the transport sector and its significance for the well being of citizens, hence the substantial investments made in road, rail and maritime infrastructure. Linked with strategies aimed at strengthening the competitiveness of the European economy, the various corridors, which are currently under way, draw the map of the future flow of goods. Where policy choices inherent to this type of investment are concerned, local and regional authorities are very careful not to find themselves excluded or isolated. They are thus actively involved in channelling these investments, either directly or through their networks.

A perfect illustration of this is the public consultation launched by the European Commission (EC) between May and September 2010 on the future policy of the trans-European transport network (TEN-T). Various Mediterranean regional and local authorities expressed their views, individually and through existing organisations or new coordination units specifically set up for this occasion. The regional

and local bodies highlighted the paradox that prevails today: the centre of gravity of European freight is northern Europe, including for products destined for southern Europe. Such products are landed in major ports of northern Europe before being delivered to the South by different modes of transport. Regional and local bodies have thus argued that the Mediterranean ports handle 25% of the global maritime traffic and therefore have a role to play and trade flows to capture and should be connected to TEN-T. They also emphasised the importance of reducing CO2 fluxes and stated that this issue should be a priority for the EU.

Emilia-Romagna highlighted the role that could be played by Adriatic ports, hence the establishment in 2010 of an association comprising Italian, Slovenian and Croatian ports (North Adriatic Ports Association – NAPA). However, it was the PACA region that was really behind the lobbying for the ports in this region and that argued in favour of a readjustment of the TEN-T towards the Mediterranean by supporting the diversification of the European gateways for long-distance freight, thus locating them closer to population centres. It also called for a better integration of the TEN-T in the peripheral areas of the Mediterranean, and for an attempt to establish a certain coherence with the trans-Mediterranean transport network (TMN-T).

Mention should also be made of the initiative taken by a group of professionals through the FERRMED association[6], who argued for the development of a rail corridor for reefer cargo which would directly connect the south of Europe to the north, thus improving the distribution across Europe of Mediterranean produce, especially fruit and vegetables. This action was rapidly taken up by regional and local authorities, in particular by the autonomous communities of Spain and, on the initiative of the city of Barcelona, it should lead to the forthcoming creation of an association, which will comprise those cities located within the area of influence of the FERRMED great axis.

The Conference of Peripheral Maritime Regions (CPMR), which is a network of nearly one hundred and sixty regions from twenty-eight countries, has also been very active. It has notably pointed out the insufficient consultation, on the part of the European Commission, of regional bodies on the TEN-T policy, even though the latter are often called upon to co-finance its realisation.

One example of the lobbying approach adopted by regional and local authorities in order to influence European programmes is the European Straits Initiative[7], launched in 2009, which brings together eight European straits and fifteen local bodies. The ESI aims for the recognition of the specific economic, social and environmental characteristics of these geographical areas, and for the emergence of territorial cooperation projects similar to those that already exist in geographical areas such as the Alpine space or the Mediterranean space, both of which have been acknowledged by the EU. Interestingly, its ambition is to open up to non-EU Mediterranean partners (Morocco, Tunisia, Turkey) in the near future.

6 - FERRMED (www.ferrmed.com).
7 - European Straits Initiative (www.europeanstraits.eu).

In an effort towards territorial structuring, Arco Latino[8], officially constituted in 2002 and comprising forty-six regional and local authorities from the western Mediterranean NUTS III level, commissioned a comparative study (Arco Latino, 2011) on its own initiative, in 2011, on local experiences in the development of the logistics and freight transport sector. The study covers Spain (Girona, Tarragona and Lleida), Italy (Piacenza and Novara) and France (the PACA cluster and the Bouches-du-Rhône department). The study concludes with a list of action priorities.

Rehabilitating local products, a new set of cards

For decades, technical progress and biotechnology were the main drivers behind the development of an increasingly standardised form of agriculture. Today, agriculture is once more favouring diversity and the territorial dimension has become important again.

A growing diversity of regional and local produce...

Local and regional bodies find themselves addressing agricultural issues more and more often, due to the growing regionalisation of the Common Agricultural Policy (CAP), the idea of improving the performance of national strategies by taking better account of local specificities, or simply because some local officials are willing to include agriculture in their development strategy (as is the case in France under the clause of "general jurisdiction").

In so doing, they end up fully integrating this component in their territorial development strategy, thus shifting from being mere executors of national policies to promoting regional agricultural strategies that seek to maximise the impact of this economic activity on the territory. Production is no longer an end in itself, it is considered in its capacity to generate employment in the region, to produce or preserve landscapes conducive to tourism, to meet the environmental challenges of the territory and create social ties among populations.

Strategies of local and regional bodies obviously highlight the specificities of territorial products, presenting them as an element of differentiation and competitiveness. This is even more true in the Mediterranean since this geographical area is characterised by a rich variety of regional products, its agricultural traditions and food cultures. In fact, we are currently witnessing the proliferation of "local products" that celebrate this almost forgotten history. This trend is not limited solely to the EU-Med countries. The countries of the southern rim of the Mediterranean too are engaged in the process of regionalisation of production, albeit largely driven by the state, as is shown by Morocco's highly proactive move to develop and promote its "local produce" as part of the Green Morocco Plan, and by Tunisia's recognition of geographical indications.

8 - Arco Latino (www.arcolatino.org).

Within the framework of decentralised cooperation[9], European regional and local authorities have embraced this theme and, following the demand of their southern partners, are becoming increasingly involved in agricultural development programmes that focus on sector structuring for specific products. For instance, the partnership existing between the Champagne-Ardenne region and the Oriental region in Morocco since 1990, led to the creation of the first two Moroccan geographical indications (GIs): the Berkane Clementine and the Beni Guil lamb. It is also interesting to note that, thanks to this cooperation, a logistics training course was set up, together with a DUT[10] in wrapping and packaging of food products in Berkane. As for the project coordinated by CIHEAM-MAI Montpellier in the framework of the partnership between the Herault Departmental Council and the governorate of Mededine to improve the income situation of farmers, the aim is to promote products from Beni Khedache, primarily on the national market (olive oil obtained from typical local varieties, mountain honey, figs, dried olives, etc.).

... combined with a restructuring of distribution channels

This trend towards product differentiation comes as a response to recent consumer expectations[11]. Nowadays, consumers want to construct an identity through the act of consumption, as is revealed by the continuing disaffection for supermarkets for the benefit of small convenience stores, and by the growing interest in products that correspond to and reflect a particular identity, even though prices remain a strong deciding factor in food purchasing, especially in times of crisis. The demand is often accompanied by a quality requirement (gustatory, nutritional, social, etc.) that needs to be "certified", either by an "appellation" ("appellation d'origine contrôlée", "appellation d'origine protégée", etc.)[12], indications of origin (geographical indication, protected geographical indication, etc.) or labels (organic, fair trade, eco-friendly, etc.). Products that are specific to certain territories obviously meet these new expectations.

Developing their range of local products becomes a form of local action for regional and local authorities, which can lead them to becoming involved in, or even to organise, new distribution networks aimed at strengthening the alliance between consumers and local producers. Hence, the proliferation of initiatives such as "from farm to farm" walks, "farmers' markets" or "randonnées découverte du terroir" (hikes during which one can discover/taste local products). All of these constitute new alternatives whereby consumers can purchase food products "directly" from the producer.

9 - The decentralised approach is relatively recent within the framework of development cooperation. Decentralised cooperation refers to all international initiatives undertaken or promoted by two or more foreign authorities sharing a common interest. French local and regional bodies are considered as being fully involved in France's international action. Cooperation of this kind is supported by the Ministry of Foreign Affairs.

10 - DUT stands for Diplôme Universitaire de Technologie, and corresponds to a 2-year University degree in technology (translator's note).

11 - This trend, which is not analysed in the present chapter, reflects an internal development within society, which was taken up by the marketing sector, with industrial processes adapting to consumers' need for individualisation.

12 - An "appellation" is a government certification that guarantees the quality of a particular product. "Appellation d'origine contôlée" may be translated as registered designation of origin, and "appellation d'origine protégée" as protected designation of origin (translator's note).

Territorial networks are also emerging, building on a common product identity or on complementary features of products that are specific to the territories concerned. The municipality of Lari, in Italy, together with the province of Pisa, the Tuscany region and other partners have thus developed a collective mark that highlights the economic and cultural value of the Lari cherry. Furthermore, a "national association of Italian cherry cities" was founded[13], so as to strengthen research in the improvement of agronomic practices and the development of product promotion. For its part, the *Terra Nostra* project, designed and implemented by Arco Latino, consists in developing an alternative model of growth in the Mediterranean, based on the specificities of each territory, through the creation of a territorial quality mark: the Arco Latino mark. Associated with rural tourism, "routes" are charted in an inter-regional synergy across the Mediterranean in order to attract consumers to the sources of local production, much in the same way as the wine routes, bio-itineraries, the route of the olive tree, or the culinary taste trails promoted by regional partners of the European Novagrimed programme[14].

In seeking coherence within local sectoral policies, interesting initiatives may result that show how local politics can affect supply and logistics. France provides us with a good example of this. Regional and local bodies, which are in charge of mass catering in primary and secondary schools, have opted for better-quality meals (for instance, by introducing organic food) and for local sourcing. Mass catering used to be implemented through calls for tenders, which favoured the lowest-priced bidders. The current approach has challenged the rules for public procurement and introduced the notion of "territorial preference". It also calls for a review of the supply chain where school canteens are concerned, in terms of having not one but several sources, favouring a greater diversification of products and respecting seasonal cycles.

Towards the emergence of integrated territorial policies on food security

Building on one-off actions aimed at the agricultural sector and the promotion of territorial products, local and regional authorities are currently succeeding in carefully organising product flows within the territory, in an integrative and holistic approach based on the notion of "better produce, better food". The initiative thus becomes political and leaves an impact on the organisation of the whole territory. Such initiatives are developing in countries north of the Mediterranean against the backdrop of the economic crisis and in a quest for new societal models capable of addressing the shortcomings of global capitalism. Such initiatives are also thriving in cities and megacities, in an attempt to provide solutions to an urban food crisis, which is highly explosive for social order.

13 - "Urban Agriculture in the Mediterranean", *CIHEAM Watch Letter*, n° 18, September 2011.
14 - Novagrimed (www.novagrimed.eu).

Nurturing cities

Throughout history, feeding the cities has always been a concern. Food security entails, first and foremost, setting up a political system that secures food supply, organising and managing stocks so as to limit speculation in food products. Even the pharaohs had organised systems of crop storage to prevent famine in times of low water.

Today, the question is all the more acute as the rate of urbanisation, which exceeded 50% in 2007-2008, is expected to reach 70% in 2050, with an estimated world population of 9.6 billion people. Even at this stage, we should be able to manage megacities that already comprise tens of millions of people and whose numbers continue to grow. In a context where logistics systems are inadequate, how can one ensure that people, especially the poorest populations, have access to basic food commodities and to a healthy and varied diet at a reasonable cost?

Urban and peri-urban agriculture may be a partial answer to this question. The FAO considers that urban and peri-urban agriculture has a comparative advantage over rural areas in the supply of fresh produce throughout the year (FAO, 2012). Thus, Mediterranean cities, which have a long tradition of urban and peri-urban agriculture, have resumed their nurturing function, with varying results depending on whether these initiatives are supported or not by local or national policies[15].

Over the last forty years, there has been an increase in urbanisation in Tunisia; as in other North African countries, this happened at the expense of agriculture. Yet, recognising the threat posed by this urban sprawl on its food production, Tunisia was also one of the first African countries to take legislative measures on this issue. Despite difficulties in enforcing these laws and preventing land speculation, food production in urban and peri-urban areas continues and many farmers are turning to market gardening: Greater Tunis and the surrounding plains supply the city with around 380,000 tonnes of fruits and vegetables per year, which represents 10% of domestic production. As access to the central market is becoming increasingly difficult, products are sold on local markets, in small shops and by street vendors at low cost (reduction of transport costs and taxes levied on wholesale markets). This type of agriculture remains, however, unprofitable for urban farmers. In Algeria, urban and peri-urban agriculture is undervalued. There are no measures in agricultural policies regarding promotion. One study has shown that local officials play a crucial role in town and country planning decisions; however, the rules to protect the agricultural heritage of the city are not applied.

In countries where decentralisation is more successful, especially in European Mediterranean countries, initiatives to develop this type of agriculture were launched by local authorities and are at times associated with new services (societal aspect, enhancing the value of natural landscapes). In Italy, dozens of municipalities have decided to attribute market-gardening areas to youngsters, pensioners and unemployed people through social support programmes. Another significant example are

15 - "Urban Agriculture in the Mediterranean", *CIHEAM Watch Letter*, nº 18, September 2011. Please refer also to Abis and Brun (2012).

the peri-urban kitchen gardens of Ostuni, in the region of Puglia: this area of great historical and landscape value had experienced a period of decline in the 1980s, but was rehabilitated thanks to a civil society initiative and the support of the municipality. Indeed, a brand was established to promote products coming from this area, and the region provided one million euros in funds for a quality policy aimed at repurposing the area[16].

Nevertheless, if food security for urban consumers is to be improved in an effective way, greater efficiency is needed in food supply and distribution systems at the local level (delivery of supplies, sorting, packaging, storage, processing, retail and street vending), a level at which regional and local bodies have a role to play, as has already been discussed. This is why the FAO has set up an assistance programme for regional and local authorities in developing countries and countries in transition to define urban policies and prepare urban development programmes in food supply and distribution systems. Some experts, however, believe that achieving agricultural self-sufficiency in cities is a utopia, and that, given our current know-how, no city in the world would be able to ensure food self-sufficiency.

Setting up territorial food systems

The first World Summit of Regions on food security[17], held in Dakar in January 2010, showed that local and regional authorities could play a key role in the fight against food insecurity and that they could respond to this challenge by adopting innovative and effective solutions. At the second summit of Regions United/FOGAR, held in Medellin in October 2012, regions from around the world committed themselves to implementing a comprehensive regional approach to food security and agreed to the principle of setting up a "Territorial Food System" (TFS).

The aim of this approach is to respond to market volatility, anticipate crises and reduce food costs by bringing production areas closer to consumption areas. This also entails mobilising the local agricultural economy towards local food security, promoting a responsible and sustainable territorial economy that optimises the use of local resources, helps to revitalise rural territories, strives to reduce waste throughout the food chain by promoting systematic recycling and an optimal consumption of products, and shows concern for the well-being of local residents.

Building on successful initiatives, a comprehensive concept of territorial approach to food safety should be developed and tested in pilot areas to show how a food supply and distribution system can gradually provide sustainable food security, especially for the most vulnerable populations in the territory, by setting up governance mechanisms in which every stakeholder is involved. The food supply and distribution system should allow for the maintenance of local agriculture in a more sustainable way, the revitalisation of traditional skills, and the consumption of local, seasonal produce. It should also encourage local processing and distribution, as well as create local jobs. In view of this, transport and logistics, which are necessary for the implementation of such a strategy, become a core issue. There have already been several

16 - "Urban Agriculture in the Mediterranean", *CIHEAM Watch Letter*, n° 18, September 2011.
17 - Regions United/FOGAR (www.regionsunies-fogar.org/en).

successful experiments (Colombia, Brazil), which could be transposed in a beneficial way to SEM countries that remain heavily dependent on imports and suffer from structural weaknesses as far as transport and logistics are concerned.

Conclusion

By implementing policies for agricultural production at territorial level, local and regional authorities become truly influential actors in the flow of products and logistics organisation given that they commit themselves to comprehensive strategies for territorial food security. What impact will such policies have in the future? Will there be a general territorial repositioning or will such initiatives remain epiphenomena in an open, globalised market?

In the future, factors that are external to territories will affect trade conditions of agricultural goods, either by counteracting or, on the other hand, by encouraging local policies. Such factors include energy costs, environmental measures aimed at reducing pollution and, of course, the population's purchasing power. Societal choices in the next few years will also be decisive. Among the questions that arise are the following: will they favour the GDP growth or enhance social well being? Will they favour government intervention or will they let the market regulate the situation?

Among the five scenarios drawn up by Samarcande Etudes et Conseil for the situation of freight and logistics in 2040 (Duong and Savy, 2011), three suggest that territories may be in more or less strong competition in a system which will become increasingly globalised and asymmetric. The last two scenarios, which focus on changing market demands and radical changes in social values respectively suggest that territories and their populations may well regain control of their destiny. As such, they would echo the policies implemented by the cities and regions that we mentioned earlier on. In these scenarios, priority would be given to local trade and short-distance transportation, local convenience stores would open again in urban centres, and direct sales would help to strengthen the ties with peripheral areas. A more self-contained economy would develop, which would favour new attitudes, particularly in terms of packaging reduction and recycling. Related logistics would consequently be modified in terms of product flows, both geographically speaking and with regard to volume.

While aiding their territories to position themselves on major international transport routes through investment and lobbying, local and regional authorities also help to devise alternative development models that are more ethical and sustainable, and that give a central role to the territory and the people living there. In this sense, new relational modes between production and consumption would emerge, which could have a significant impact on the organisation of transport and logistics, should they become widespread.

The power that local and regional bodies have when it comes to organising and promoting local dynamics, in conjunction with public policies and corporate strategies, deserve to be given more consideration in the earliest stages of transport policy-making by the European states. Such an approach would be even more relevant for the SEM countries, many of which need to commit themselves to transport

policies and logistical arrangements, and move forward in the regionalisation process, the aim of which is to give greater power to local and regional bodies. This new role of local and regional authorities, whose importance is increasingly growing, should also be better taken into account in research programmes and in Euro-Mediterranean cooperation programmes, so that innovative experiences are better analysed and shared. Let us hope that these issues will be addressed by CIHEAM and its institutes in the coming years.

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CHAPTER 28

INNOVATION IN LOGISTICS AND IN THE SUPPLY CHAIN INTEGRATED APPROACH

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Since it deals with products from the processing of raw materials to delivery to customers, the supply chain allows to take a step towards sustainability especially as the paradigm shift of the supply chain to that of "managing the supply chain" allows more attention to the ecosystem through the adoption of two different models of chain, the "closed-circuit" and the "triple bottom line". In order to make supply chain management more effective, it is important to implement an innovative design using new managerial practices and enabling technology. Innovation in this field can be defined as "a change (incremental or radical) within the supply chain network, supply chain technology, or supply chain processes (or combinations of these) that can take place in a company function, within a company, in an industry or in a supply chain in order to enhance the creation of new value for the stakeholder (Arlbjørn *et al.*, 2011). From a general perspective, innovation in the context of the supply chain focuses on products, processes or services and it mainly aims at reducing costs, improving efficiency or increasing customer satisfaction. The degree of innovation may be related to both technological and non-technological aspects. Technological innovation mainly concerns new products and new production methods as well as the introduction of new technologies while non-technological innovation could be related to both organisational (intra-organisational innovation) and market innovations (inter-organisational innovation).

The new information and communication technologies (ICT), mechanics, chemistry, biotechnology and logistics using and integrating these technologies, provide better communication between the various actors in the agro-food sector, facilitate the improvement of quality and service of the industry, adapting it to the needs and preferences of consumers, and open new markets for agro-food products. At the organisational level, collaboration is considered as a key driver for innovation. Collaboration among the supply chain actors may facilitate the sharing of tacit and

explicit knowledge and innovation. Furthermore, it also helps improve performance. The benefits of collaboration include improved revenue, reduced costs, operational flexibility and ability to cope with high demand uncertainties, resolution of operational problems through a collaborative approach.

The integration of the food chain also allows for a new and more effective approach to the problem of food security. Protecting the food supply is a target that could only be reached through a multi-disciplinary approach taking into account all stages of the food production chain. To intervene effectively at each stage of the supply chain, a comprehensive and integrated view on food safety is necessary. In fact, all these stages of the supply chain should be optimised on the basis of the cost-benefit analysis of the possible adoption of a multi-hurdle approach and the concomitant effects on food quality (hedonistic, nutritional and functional properties). Furthermore food safety is increasingly not only a prerequisite for marketing, but also a factor of competitiveness, as consumers increasingly require safer and more sustainable food products. Food safety is therefore closely related to food quality.

Logistics, food chain and supply chain management

The meaning of supply chain management is often confused. In the minds of those who use it, it is just another way of talking about logistics or logistics including customers and suppliers. Strictly speaking, the supply chain is not a chain involving relations between the firm and the client of between a company and another. The term refers more to the management of multiple relationships that underlie the supply chain as the concept is defined as follows by the members of the Global Supply Chain Forum[1]: "Supply Chain Management (SCM) is the integration of key business processes from end users through original suppliers that provides products, services and information that add value for customers and other stakeholders". SCM thus captures the synergy of integration and management within and between enterprises. In this sense, it relates to the overall excellence of the process and represents a new way of managing the business and relationships between actors in the supply chain.

Given this emerging distinction between SCM and logistics, in October 1998, the Council of Logistics Management (CLM)[2] announced a modified definition of logistics. For CLM, logistics management is only a part of SCM. The revised definition is as follows: "Logistics is that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point-of-origin to the point-of-consumption in order to meet customers' requirements".

Logistics is a key sector for the European economy: not only it accounts for about 14% of the GDP in Europe, but its impact on the quality of the EU manufacturing and service sectors is substantial, thereby determining the competitiveness of Europe

1 - The Global Supply Chain Forum (www.theglobalsupplychainforum.com).
2 - Since 2004, Council of Supply Chain Management Professionals (CSCMP) (http://cscmp.org/).

vis-à-vis other world regions. The Alliance for European Logistics (AEL)[3], established in November 2008 during the 1st European Logistics Summit aims at promoting a new policy agenda for logistics services in Europe, bringing together both the major providers in the field and global companies that rely on efficient logistics. In October 2010, the AEL has developed a *Technology Roadmap for Logistics* (AEL, 2010), to establish a comprehensive and integrated European strategy to support and facilitate financial incentives tailored to ICT and green technologies for European transport and logistics operations. The AEL calls on the European Commission to develop the potential of technology to optimise transport in Europe.

The European Technology Strategy for Logistics is based on five closely related pillars:

1) *Collaborative Logistics* enable all partners in the logistics ecosystem to work together to optimise their relationships and therefore maximise value and benefit.

2) *Adaptive logistics* ensure operational excellence in the highly reactive context and tight deadlines that characterises the programming and implementation of logistics.

3) *Green & sustainable logistics* ensure the effectiveness and sustainability of all logistics processes along the chain in the use of resources, a major cost factor.

4) *Intelligent logistics* enable to take quick and appropriate decisions in real-time, at all levels within the company and among many others, and support human skills and knowledge through the use of intelligent IT tools.

5) *Transparent logistics* allow for full visibility into business processes in logistics, making available quality, reliable and sufficient information, which has an impact on them.

The availability of safe, sustainable and healthy food is increasingly becoming a major issue, given the continued growth of the world population and the increasing environmental and sustainability concerns. The need to meet consumer demands in terms of high quality products, healthy diets, affordable prices, fair and equitable relations in the food supply chain, food safety, and ethics of productions are a huge challenge. In addition, climate change, competition for agricultural land use and shifting dietary habits are constantly changing the supply/demand scenarios. In order to make the food supply chain systems safer, more performing, resilient, efficient and fair, it is necessary to take account of the links between food quality, health and welfare of customers and issues related to the exploitation of ecosystems, sustainability and biodiversity.

The food supply chain connects three important sectors: agriculture, food processing and distribution that together make more than 7% of European employment. Its performance affects customers, since food represents on average 16% of European household expenditures. In 2008, a communication from the European Commission (CEC, 2008) aiming to improve the functioning of the food supply chain in Europe proposes:

3 - Alliance for European Logistics (www.logistics-alliance.eu).

- To promote sustainable relationships, based on the market between the different stakeholders of the food supply chain;
- To increase transparency in the food supply chain;
- To strengthen the integration of the internal market for food and the competitiveness of all components of the food supply chain.

In addition, the increasing industrialisation and globalisation of agriculture and agro-food production bring new and perhaps greater risks associated with the mass production and distribution of food. The stretched but fragmented supply chains put together diverse food production systems which have different levels of safety awareness, varying degrees of regulation and enforcement capacities of the existing provisions, while agro-food products are exposed to risk of contamination at various processing stages which are managed by different actors. Regulations relating to food safety continue to evolve due to the diversification and the variability of the sources of contamination, the introduction of new technologies, the use of new materials in the production cycles, and the scientific progress on the health effects of different substances. The structure of the value chain is closely related to food safety and quality standards, which is a significant change to adapt to the globalised and liberalised food production regime (Gereffi and Lee, 2009).

Overview of the European approach

For many years, a large number of European research programmes promote innovation in logistics and integration of the food supply chain (see Table 1). One of the most innovative dimensions of the last work programme (2013) is to pave the way for an integrated approach, i.e. a single conceptual framework, a system encompassing the entire food system supply chain from ecosystems to consumers, taking into account all the actors of the system, individually or in interaction with each other. Europe is also facing the challenge of developing innovative and sustainable logistics systems both from an ecological and from an economic point of view, enabling companies to remain competitive, while having a minimal impact on the environment, and without compromising their ability to meet stringent safety and security requirements. It is therefore essential to have a complete vision of the planning and control of logistics and the supply chain to reach the ultimate goal, which is to increase by 50% the efficiency of logistics in terms of competitiveness and sustainability by 2020.

It is also worth mentioning other projects dealing with issues relating to the control of food contamination, traceability or innovation in packaging (see Table 2). In general, the funded projects have been developed to meet consumer expectations and to develop new approaches to food safety and quality. The solutions to the food chain problems lie in the improvement of the supply chain management infrastructures. The idea is to innovate and better organise the supply chain and to contribute to transparency and sustainability, providing all stakeholders of the agro-food chains intended for human or animal consumption, with a central decision-support system with integrated tools, methods, models and guidelines. Innovation must involve all operators, since it is supposed to add value to the food chain as a whole and lead to new sustainable applications.

Table 1 - EU Projects strictly related to innovation in logistics and supply chain integration

Project Title	Project Acronym	Programme	Start date	End date
Evolution of agro-food production systems		FP6-JRC	2003	
Quality, safety and value optimisation of the milk supply chain in rapidity evolving Central and Eastern European markets	OPTIMILK	FP6-FOOD	2003	2004
E-platform technologies for the European agro-food supply chain	E-MENSA	FP6-FOOD	2005	2006
GM and non-GM supply chains: their CO-EXistence and TRAceability	CO-EXTRA	FP6-FOOD	2005	2009
Developing and integrating novel technologies to improve safety, transparency and quality insurance of the chilled/frozen food supply chain	CHILL-ON	FP6-FOOD	2006	2010
Safe and high quality supply chains and networks for the citrus industry between Mediterranean partner Countries and Europe	EUROMED-CITRUSNET	FP6-FOOD	2006	2008
European mountain agro-food products, retailing and consumers	EURO-MARC	FP6-POLICIES	2007	2010
Secure supply chain management	SECURESCM	FP7-ICT	2008	2011
Impact of climate change and globalisation on safety of fresh produce governing a supply chain of uncompromised food sovereignty	VEG-I-TRADE	FP7-KBBE	2010	2014
PRactical Implementation of Coexistence in Europe	PRICE	FP7-KBBE	2011	2014
Retailer and Consumer Acceptance of Promising Novel Technologies and Collaborative Innovation Management	RECAPT	FP7-KBBE	2011	2014
Food Planning and Innovation for Sustainable Metropolitan Regions	FOODMETRES	FP7-KBBE	2012	2015
European Platform Driving KnoWledge to INNovations in Freight Logistics	WINN	FP7-TRANSPORT	2012	2015

Source: Adapted by the authors.

Table 2 - Number of EU Projects related to innovation in logistics and supply chain integration funded under the different work programmes

Funding Programme		
	FP6	FP7
Total number of EU Projects of interest for Innovation in Logistics and Supply Chain Integration	22	26
Number of projects strictly related to *Innovation in Logistics* and *Supply Chain Integration*	7	6
Number of projects related to Innovation in Logistics and Supply Chain Integration	15	20
Number of ongoing projects		24

Source: Adapted by the authors.

Moreover, there is a need to integrate research in this area, which the European projects promote by means of initiatives to stimulate cooperation – at international level and between research organisations and commercial operators including SMEs – to create a network of horizontal research interest, especially for the Mediterranean region. The analysis of the supply chain from fork to farm must measure the relevance of new strategies and strengthen collaboration. The research is currently focused on creating practical tools and methods for supply chain integration. The study and comparison of technical, logistical, organisational and governance aspects of innovative food chain systems in different cases (e.g.: milk, cereals), will enable the identification of best practices when involving regional stakeholders, both business and policy-makers in a sustainable food planning. The use of information and decision support systems, tightly integrated with advanced internet-based networks and services, can enhance intelligence, efficiency, durability and performance of the agro-food sector. In this sense, some projects focus on the development and promotion of new platforms and technologies, in order to obtain a broad and open network accessible to all logistics clusters, networks and companies operating worldwide or at European Level. Thus, in the framework of the HORIZON 2020 programme, the European Technology Platform on Logistics will be the voice of the sector (industry, authorities and research) in order to channel the main areas of development in RTD (research and technological development) and innovation in the logistics field.

New approaches to logistics and Supply Chain Management

Innovation in logistics is strictly related to the implementation of new ICT solutions. The introduction of advanced hardware and software technologies and the development of adequate Electronic Data Interchange (EDI) systems are the basis for the optimal control of the continuous flow of material and information throughout the

supply chain. Proper planning of these flows actually allows to minimise delivery times and to reduce waste (bankrupt deliveries).

The collaboration between the various components of the supply chain is a crucial factor of the Supply Chain Management (SCM). The concept has three different dimensions:

- The sharing of information, i.e. the collection and rapid dissemination of relevant information to enable decision-makers to plan and control supply chain operations.
- The synchronization of decisions, i.e. the joint decision-making involved in planning and operations.
- Incentive alignment, i.e. the extent of sharing of costs, risks, and benefits between the actors of the chain.

The competitive advantages of companies can stimulate and support collaboration. Competitive advantage is the ability of a company to protect itself against its competitors. Five factors contribute to the competitive ability: competitive pricing, premium pricing, value-to-customer quality, reliability of delivery and innovation in production.

ENEA is currently involved in two national research projects related to innovation in logistics and supply chain management ("ORTOFRULOG" and "Magazzino Viaggiante"), in which the above-mentioned essential aspects (collaboration and competitive advantages) are considered.

Box 1: Project ORTOFRULOG

ORTOFRULOG is an *innovative logistic platform for fruit and vegetables for national and foreign markets*. The project was funded by the Italian Ministry of Economic Development on 1 March 2012 for a period of three years. The *Centro Servizi Impresa* is responsible for the project coordination and communication with the partners: ASD Produzione, Consorzio BESTAK, Tecnolog Engineering, Alegra, Arca-Fruit, IDNOVA and ENEA. The project proposes to develop a prototype of an innovative logistics platform, based on the use of ICTs for national agro-food productions of range I and IV, and designed for domestic and international markets. This prototype will be the main hub of a network based on national territory but closely linked with similar foreign networks operating on the market of fresh and processed food.

The overall objective of the program is to improve the competitiveness of domestic fruits and vegetables through the use of cargo, the maximization of customer satisfaction and environmental protection.

- *ICT-based logistics platform* – It will standardise as far as possible, the use of hardware and software technologies to reduce delivery times; to allow continuous monitoring and real-time recording of parameters that are critical for storage of products; to ensure compliance with mandatory rules of hygiene and traceability of the productive chain, fight against waste (failed deliveries) and increase the number of satisfied customers.

- *Innovative systems for packaging* – New packaging will be designed considering the final destinations; respecting the existing standards; with technical, structural and micro structural characteristics calibrated depending on the product, ensuring the best possible hygiene, with an economic and environmental impact as limited as possible.
- *Measurement and control of product quality* – Prototypes of devices (sensors) will be developed to measure key parameters for monitoring and maintaining the quality of transported and stored products, but also useful in tracing the productive chain. Innovative biological physical technologies will be applied to protect the products after harvesting and during transport/storage.
- *Validation of the prototype* – The program will conclude with the development and validation of a prototype logistics platform, which will be based on all the results obtained by simulation approaches. A qualitative and quantitative assessment of the benefits in terms of reliability, reproducibility, safety, effectiveness and efficiency (cost reductions) will also be carried out. The program will end with the completion of the prototype of logistics platform.

The basic principle underlying the development of the organisational platform, is the "alignment of the interests of the whole chain/network with the interests of all the member enterprises". In order to do so, the two following criteria were adopted:

- Actions of mutual adjustments, the very essence of collaboration among the member enterprises, have been identified, transformed into "alignment actions" and integrated into collaborative processes that apply to different functional areas of the chain. In addition, for each of them and depending on the actual circumstances, an evaluation is made of the benefits expected for the whole chain, and of the costs for member enterprises which have to implement these alignment actions. The alignment action is successful only if the expected benefits outweigh the costs.

- In the process of distribution of profits reaped by the market, the enterprises, which have implemented the alignment actions, are compensated for the costs they have incurred.

With these two criteria, the alignment actions proposed benefit the whole chain/network, as well as for of the members so they are adopted without any particular pressure by the coordinator. In addition, each alignment action involves greater collaboration by definition as they consist of a mutual alignment. This should help solve the problem of vertical integration. Moreover, the efficiency of the entire chain is improved as long as its benefits are higher than costs. The real added value lies in the fact that actions of alignment are predefined and standardised for different processes of collaboration in chain/network management, and the cost-benefit analysis is automated through the IT platform developed ad hoc for this purpose.

Box 2: Project Magazzino Viaggiante

Funded by the Italian Ministry of Economic Development and coordinated by FS Logistica, the project started on 1 June 2011 for a period of three years. The partners are: Tecnoalimenti, ENEA, LIUC (University "Carlo Cattaneo"), Villani, Sapio, Plastoblock, Engineering Ingegneria Informatica, Ortoreale, Paste Tipiche Regionali. The project focuses on *a new managerial system, for chains and networks.*

Using a multidisciplinary approach, the project serves three main objectives, namely the development of a new logistics model, the development of new transport units and the opening of an interoperable platform. It proposes a chain system with a high level of collaboration and efficiency. From the beginning, the focus is on the additional managerial effort required and the economic burdens, which are the main obstacles to achieve higher levels of collaboration. The solution proposed by the project is a managerial system, for chains and networks, named SMEC (Small Medium Enterprise Chain) with:

- An Organizational Platform whose specifications have been developed under the supervision of the research institution and which define the collaborative processes among member enterprises of the chain;
- An Information Technology (IT) Platform, made ad hoc by the IT developer, which supports the implementation of the above-mentioned collaborative processes.

Table 3 - Main lines of intervention of the SMEC approach

	Direct effect
Supply contract	Increased revenues
Operation optimization	Reduced costs
Unified logistics	Reduced costs
Quality alignments	Increased capacity of customer satisfaction
Support to innovation	Increased capacity of customer satisfaction
Strategic planning	Increased capacity of customer satisfaction

Source: Adapted by the authors.

Table 4 - SMEC Approach to cost minimisation

1. Objective Function which models the total chain cost to be minimised.
2. Set of constraints on the variables upon which the cost depends.
3. Software application, which collects, through the internet, the data of costs from member enterprises and organises appropriately these data for their input.
4. Another software application, of mathematical programming, which solves the minimisation problem described by the Objective Function and the constraints.
5. Providing solutions to minimisation problems, by the same software application, as in 3 above, which converts them into supply orders for the member enterprises.
6. Transportation management software, which analyses the supply orders and can change them in order to find a more efficient configuration reducing the total cost.

Source: Adapted by the authors.

The SMEC system includes six lines of intervention in the areas of major interest of chain/network management. They are presented in Table 3 of Box 2, where the effects of each line of intervention are indicated. The SMEC approach to cost minimisation is briefly described in Table 4. When supply orders are changed by the transportation management application, the Objective Function is rewritten, with the new data of transportation costs, and the above cycle of optimization is repeated. The Objective Function has the following form:

Total chain costs = Σ *(Production cost + Transportation cost + Input inventory cost + Output inventory cost)*

The sum (Σ) is extended to all member enterprises. For the four terms of cost, for which both variable and fixed costs are considered, the initial default values assume minimization within the single enterprises, including transportation companies. Similarly, inventory costs are written following the Economic Order Quantity (EOQ) model (Ghiani *et al.*, 2004). However, the formula cannot be applied to both input and output inventories, which are all subject to consistency constraints (the output of a member is the input of the downstream client member). Hence, the EOQ model has only been applied, to the input inventory cost (usually, it is the client that has major control of the orders). Consequently, the output inventory costs have been recorded for inventory levels consistent with the input inventory levels, established according to the EOQ model. This enables an Objective Function that takes account of all the costs incurred throughout the whole chain (and this model is considered as an innovation introduced by SMEC).

The IT Platform plays a fundamental role in the SMEC system as it assumes the automation of most of the collaborative processes proposed, which facilitates their implementation by member enterprises. The Platform consists of the basic components of a typical Business Process Management system (Khan, 2004), around the application server (Java based in SMEC), a process modelling component that defines the processes to be executed and a process execution engine is then used to conduct the action. A process simulation component can be used to verify the relevance of the defined processes and related performances.

The Data Base Management System (DBMS) enables the collection and management of the data related to the chain/network and its member enterprises. There are two Optimisation Applications: the first is a Mathematical Programming application based on the Simplex Method of optimisation, and the other is a Transportation Management application while the other one is based on a mixed approach (Mathematical plus Heuristics) in charge of identifying the lowest cost configurations for the transfer of resources among member enterprises. The users, i.e. the designated representatives of the member enterprises, communicate with the system via Internet through interfaces built and managed with a Portal Server component.

The IT Platform supports the implementation of the following four lines of intervention: supply contracts, operational optimisation, unified logistics and strategic planning. The results of these lines of interventions are submitted to all involved members for approval or specific decisions. These approvals/decisions are then

collected through the predefined web interfaces with additional information that each member must provide, depending on the processes envisaged. The platform collects the information and proceeds to the next step of the process and so on, through each step, until the end of the process. The platform provides member companies with the proposed alignment actions, with the related evaluations of costs and benefits and waits for their approval before proceeding as expected. The possibility of disagreement is anticipated where appropriate and the systems alternatives to the members after obtaining the necessary information.

The design and operation of the IT Platform enable the supply chain to simulate the application of the SMEC approach to its operations and to anticipate the related quantitative effects, before the approach is adopted. Each chain is then able to decide to apply or not apply the SMEC system, knowingly.

Supply chain integrated approach for the valorisation of Mediterranean products and safety

The Italian agro-food sector includes a wide range of vegetables and animal feed products of high qualitative value and organoleptic properties. The excellence of these products are primarily due to all the selective production of raw material and the cultivation methods applied, and finally the optimal conditions for storage and transportation. The use of high quality raw material rich in flavour (aroma and taste) enables the production of high sensory quality food products "made in Italy" with unique organoleptic properties and internationally recognised excellence.

ENEA is currently involved in the national industrial innovation promotion project "Food Flavour", aimed at identifying new indicators to measure quality throughout the supply chain, the perceived sensory characteristics along with the chemical, physiological, microbiological aspects that are widely known for Italian vegetables, fruits and meat products.

Box 3: The "Food Flavour" project

Funded by the Italian Ministry of Economic Development and coordinated by Neotron Spa, the project started in November 2010 for a period of three years. The partners contributing to its achievement are: ENEA, CAFAR, MAGEMA, LINEAVERDE, Martini Alimentare, Pontlab, Masterpack. The project focuses on *Advanced methodologies to guarantee the origin of Made in Italy food product and new technologies for the improvement of sensory quality*.

Objectives of the project:

- To provide significant new data and knowledge on the "perceived quality" of a selection of Italian fresh vegetables, fruits and meat products during their conservation;
- To establish sensory and flavour profiles of selected food products;

- To introduce innovative production processes and packaging to extend the shelf-life and improve the "perceived quality" of selected food products;
- To develop an integrated technological approach able to identify new food quality indicators;
- To promote the "Italianity" of the food products in terms of origin and natural aromatic component.

The "*Italianity*" of the food products is studied in detail together with the maintenance of health and hygiene conditions foreseen by Italian and European regulations. The project involves the introduction of the concept of excellence of "perceived quality" of the characteristics of "made in Italy" food products, through the development of a new integrated approach of methodologies and technologies mainly based on genomic sciences, proteomics, metabolomics and metagenomics associated with innovative production processes and improved packaging that stabilise or maintain the quality of Italian food products throughout their conservation.

Therefore, besides the biological shelf-life, well known in the food industry (the validity of a product depends mainly on the development of microbial populations), the idea is to develop new indicators of the duration of sensory conservation: antioxidant component; organoleptic profile; bacterial contamination; metagenomic profile of bacterial communities; geographical origin; chemical stability; genomic, proteomic, aromatic and metabolic profiles. This concept introduces the correlation between the shelf life and sensory-related degradation of the food product linked to oxidation, ageing, and not only caused by microbial contamination.

In the food sector, the safety factor is essential for the free movement of goods and represents the basis of any strategic plan of development and innovation. Supply Chain Integration allows giving more attention to food safety issues. In fact, protecting food supply is a target that can be reached only through a multi-disciplinary effort, taking into account all the phases of the food production chain. To intervene effectively at each stage, a comprehensive and integrated view on food safety is necessary. The entire supply chain should be optimised, taking into account the cost/benefit analysis, the possibility to use a "multi-phase" approach to food quality (hedonic, nutritional and functional properties). New technologies for food safety in an integrated supply chain approach will help redefine the agro-food scenario, through prevention, control and technological innovation actions. This will lead to a positive impact both on the supply chain operators and consumers, since it will avoid processing (expensive for the industry) and the marketing of products high in chemical and biological contaminants, of which consumers are increasingly wary because of their direct effects on health. The growing concern of environmental pollution and bioaccumulation of toxic substances in the food chain, will increasingly determine consumer choices in favour of products with a low levels of contaminants, creating a distinctive added value in national and international markets. Besides an essential requisite for marketing, food safety is increasingly becoming a factor of competitiveness.

ENEA has recently coordinated the preparation of the project "Safe&Smart" for the National Technology Cluster Agrifood. This project focuses on the safety of the agro-food system through the development of innovative technologies in various

stages of the agro-food supply chain, by reshaping an evolved and integrated scenario of systems for risk prevention and early detection of chemical and biological contaminants or other undesirable substances. The challenge is to convert the problem of food safety in a factor of competitiveness and development for the agro-food system, with significant outcomes for other sectors of industry involved and technological services.

Box 4: Project "Safe&Smart"

"Safe&Smart" addresses new enabling technologies for food Safety and food chain integrity within a global scenario. Funded by the National Technology Cluster Agrifood (Ministry of Education, Universities and Research) and placed under the responsibility of ENEA-UTAGRI, the project is composed of 19 partners (3 public and 16 private) and 8 consultants (6 public and 2 private). Private partners are large companies, SMEs or ATI (Temporary Association of Enterprises). The project, for which funding has been approved, will extend over three years, starting in June 2014.

The ultimate objective is to guide the agro-food system towards an advanced and integrated system of risk prevention and early detection of chemical and biological contaminants. The areas of intervention are:

- "Diagnosis", with the development of new diagnostic systems, for the early detection of undesirable substances in food products and the control of chemical and biological contamination throughout the different supply chains;
- "Prevention", with the development of strategies for prevention/control/reduction to support food safety all along the entire production and supply chain.

The project also includes the establishment of a multi-channel and multi-device informative platform focusing on the agro-food supply chain integrity and able to provide a real time interface with the monitoring processes and devices, so as to ensure any warning in real time along the entire supply chain. In addition, new integrated technologies are envisaged to establish an interface between the packaging and domestic conditioning systems and to provide the product with information on the origin and process and with all the useful information on food safety required by the consumer. This project is expected to pave the way for new scenarios of domestic product management. The involvement of the end user is required to establish a more "safe" virtuous cycle of demand and supply of products and to enforce the image of Italian production, as well as the consumer's trust.

Conclusion

Protecting the food value chain is a target that can be achieved only by a multidisciplinary effort, taking into account the different stages of the food production chain. The application of new enabling technologies within the Supply Chain Integrated Approach, could help redefine the agro-food scenario, reshape the value chain towards advanced scenarios in which all the enterprises benefit from better management processes and new products and services. In fact, a strict control of raw materials could help detect all risks and act quickly in critical phases (using appropriate corrective

measures to prevent the processing of non-conforming products), with obvious advantages for all the operators involved in the entire supply chain.

In addition, these new integrated technologies, allow the creation of an "intelligent" scenario of systems and devices capable of interacting with all operators to significantly improve the level of knowledge and management processes related to food quality and safety. As regards foods safety more specifically, a comprehensive approach (from primary production to the final consumer) to Supply Chain Integration could ensure its effective optimisation and improvement throughout the supply chain in which therefore distinguishes it on national and international markets. As we have seen in this chapter, it is essential to take the consumer into account. Indeed, globalisation, the growing complexity of the food chain and the recent food crises have raised consumer awareness on the quality and authenticity of the food they consume. The public is increasingly concerned about the reliability of the entire agro-food system from inputs, production, and distribution to consumption.

It is more than necessary to develop food standards in line with the new structure of the value chain, addressing food safety concerns, such as pesticide residues and food additives, which include issues of food quality but also social and environmental issues. New communication strategies, allowing consumers to make more informed choices, should also be applied. Considering that competition in the agro-food sector today is more based on quality and price and focusing more on goods with higher added value, the competitiveness of food producers from the Mediterranean region should also be strengthened, by adding value to their products in terms of health, origin, authenticity, quality, sustainability, ethical productions and social impact.

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CONCLUSION

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The key role of logistics in the agricultural global markets and in the Mediterranean

To really understand the challenges that logistics pose for Mediterranean countries it may be worthwhile to start with the key concepts. Logistics is a system devoted to making operational trade. It is a double flow of information and services organized as a chain of activities to manage the time and the space involved in a movement of goods. Bad logistics increase cost and hinder trade expansion. Without trade there is neither integration nor economic development. This makes logistics one of the main engines of growth in the current global markets.

Logistics look like Information and communications technologies (ICTs). There is a hardware that consists of the infrastructure for transport (roads, ports, airports) and ICTs and software that consists of the procedures that guide actors' behavior. In theory, the principles of timeliness, security, reliability and efficiency should rule the whole system. In practice, it is difficult to make this long chain work in a synchronized and coordinated manner.

Logistics is a sophisticated industry, highly demanding and innovative, both in its "hard" and "soft" dimensions. It is competitive logistics that make it possible for modern techniques such as "outsourcing", "just in time" or "global supply chain management" to work.

Agro-logistics is a specific field of logistics even more demanding due to the fresh nature of many food products and their time-price constraints. These special needs give advantages in today's world to road transportation and make cold systems an indispensable asset. Apart from some performing export chains, the current cold facilities are not enough, and much more investment is needed (Chapter 16). Logistics is intensive in energy so it must be efficient in order to make food value chains competitive.

A critical step that influences the role of logistics in trading activities is the passage through national borders. Goods must get through the controls of the concerned public entities (Customs, Sanitary and Phytosanitary Health, etc.) to follow their way. This often creates "logistics failures" due to the lack of coordination, the burden

of bureaucratic procedures, time loss, the high cost of inspection and, in some cases, even corruption.

Due to the risky and perishable nature of many agrifood products, the logistic failures can make trade barriers more costly. Time procedures and food safety standards are a recurrent concern for traders. Strict requirements, costs of compliance and limited access to testing facilities are among the most prohibitive burdens for exporters (Chapter 23). Facilitating trade needs significant investments (e.g. infrastructure) and deep institutional reforms (e.g. Customs).

There is a link between logistic efficiency and development. The most developed economies have an advantage in logistics – according to the Logistic Performance Index 2013 published by the World Bank, the first EU's Mediterranean country in terms of logistics development is France (12th) and the first non-EU country is Turkey (20th). Trade and development favor investment in huge infrastructure, modern procedures and knowledge. Great logistics firms are located in the US, Europe and emerging Asian countries.

History is helpful to understand the current logistics challenges in the Mediterranean region. Today, trade and transport are global activities, as it is for logistics too. However, in the past they were only regional, and then the Mediterranean was a central region.

Trade integration and food imbalances

The Mediterranean was once the heart of the world. Great old people such as Phoenicians and Greeks grew up and expanded crossing the *Mare Nostrum* by boat. A lot of trade, logistics and navigation innovations arose in their most important ports. A great civilization, the Roman Empire, was able to rule over all the Mediterranean shores, and old Romans created a sophisticated logistic Mediterranean network to secure food supply to the metropolis and their troops.

During centuries, dependency relationships prevailed between the North and the South but a new order emerged in the Mediterranean after the Second World War (Chapter 1). Today, the Mediterranean has lost its central world position; it continues to be strategic for global trade and transport networks, however more as "transit space" than a great market (Chapter 15).

Since the beginning of the twenty-first century, even if some cleavages persist, a new framework exists. The EU is working to deepen the integration between Mediterranean countries – both North/South and South/South – and is launching new cooperation initiatives to create and promote commercial and economic links. It is a challenging task because today, unlike in the past, distance is not the only factor determining trade (Chapter 2). Nowadays, transport and logistics' costs increase with far distance but big markets can be cheaper – by scale economics – than trade with neighbors. Without efficient logistics, proximity's advantages lose their geostrategic role (Chapter 6).

The current trade and social Mediterranean situation is internally and externally in disequilibrium. Food and agricultural products are at the center of this disequilibrium. In fact, the Mediterranean is the region of the world that is most dependent on external supplies – and this dependence is expected to grow in the coming years. In 2011, countries bordering the sea accounted for 16% of world imports of agricultural and agro-food products while they represent 7% of the global population (Chapter 5).

Several Mediterranean countries suffer from serious food security problems, and some of them are in a critical situation of food insecurity. Developing Mediterranean countries have increased their food dependence and a great volume of imports comes, for certain agricultural commodities, from long distant sources (Chapter 25). This is a historically new phenomenon because trade was stable in the early 1960s, the Common Agricultural Policy (CAP) of the current EU being one of the causes of the reversion of trade (Chapter 1).

Programs to develop agriculture and to improve food security are State's policies in most countries. Morocco and Turkey are well known examples of ongoing agricultural revolutions with ambitious plans for increasing production and exports. The issue also concerns rich Gulf Cooperation Council countries – great food importers, although not directly affected when high prices rose sharply in 2007 and 2008 – which are investing huge resources for promoting their agriculture in dry lands to achieve food security (Chapter 7).

While external dependence appears as a global constant for most Med countries, the situation may change depending on the type of product. Great imports chains are cereals (Chapter 8), seafood (Chapter 10) and meat (Chapter 12); and great exports chains are fruits and vegetables (Chapter 9) and olive oil (Chapter 11). In other products, like wine, the Mediterranean region has lost its past central role as the main international market due to a combination of two factors: the disappearance of the wine industry in the Southern Shore, due to social and religious reasons, and the recent *boom* of the non-European New World countries (Chapter 13). However, the big globalization of wine markets and the emergence of new and huge classes of consumers in the developing world are opening new opportunities to the Old World Med European and leading world's exporters (Italy, Spain and France).

For both importing and exporting chains, competitiveness and food availability depends on logistics performance. Some supply chains, like the ones for fresh fruits and vegetables, have shown their capacity to meet the most demanding requirements. That is because this sector is the pioneer of the agro-food globalization and it has increased exports and diversified portfolio. Spain and Morocco are good examples of efficient fruits and vegetables logistics (Chapter 9).

Olive oil is also a good example of the new trade opportunities and logistic challenges for the Mediterranean region. Olive oil is a pure Mediterranean product and its production and consumption has been historically limited to the region. Today, globalization creates new opportunities for Mediterranean producers to export to non-traditional markets. Since olive oil production is more expensive than other vegetable oils, logistics

is a key driver of competitiveness for producers. The use of information technology and improvements in sea roads could improve export growth (Chapter 11).

The meat supply chains face more logistics difficulties since frozen and fresh meat and live animal transport are very exigent in terms of controls, animal welfare, sanitary barriers and traceability. The commercial change of fresh meats to alive animals involves gross investment in dedicated logistic facilities (Chapter 12).

Agro-trade and food-logistics: A strategic agenda for Med integration

In this framework, and in order for public and private entities to design their trade and logistics strategies, countries must identify the shortages in infrastructure and the transport and logistics weakness that hinder competition and trade integration with their neighbors (Chapter 19).

The limited trade flows among Sub-Saharan Africa and the Arab world, concentrated in few products, is due in great part to the poor quality of transport infrastructure. This logistics deficit increases the marginalization of these agricultural regions by generating additional production and transaction costs (Chapter 3). In some chains, such as cereals, critical for food security, the costs due to poor logistics are particularly high. Southern and eastern Mediterranean countries should reduce losses, enhance storage capacity, overcome the domestic production deficit, facilitate the transport of grain and limit the financial burden dedicated to the purchase of grain (Chapter 8). The situation is especially difficult in some countries, due to strong bureaucratic trade barriers and a long retard in the field of internal and external logistics (Chapter 19).

In general, the logistics shortages are numerous. The most significative are the poor system of road transport and the lack of cold storage facilities – except for some performant's export chains –, where better labour training and a confident institutional framework are especially needed (Chapter 16). In the South, road transportation is dominated by informality and old trucks, although the entry of European transport firms and the great distribution entry are promoting a modernization of the sector (Chapter 24).

Other important weak points are port infrastructure and intermodal facilities. Even if in agricultural trading the percentage of the agricultural products transported by ships is not as high as in other industries – in most cases the transportation is taking place by reefer trucks –, Mediterranean ports are expected to remain "in the game" in future years. This is due to the EU promotion of shipping transportation – in particular, to shift cargo from road to sea is one of the aims of the White Paper for the Transportation of EU – as it is reckoned as the most environmentally friendly mode of transport (Chapter 14).

Better transport and logistics chains can help to open new and more efficient trade ways, especially for net food importers suffering food shortages. Big potential importation routes come from Black Sea countries (Russia, Ukraine and Romania) and Central Asia (essentially Kazakhstan). These countries are great grains and cereals

exporters, and Russia and Ukraine are already very important suppliers for countries like Egypt. However, a great challenge still exists in terms of logistics infrastructure in these routes (Chapter 4).

The new commercial flows, in part due to logistics, are already changing the traditional Mediterranean equilibrium power. The EU is still the leading food provider and leading investor for the Mediterranean countries but non-Mediterranean countries are entering into the regional agricultural trade and that is a "siren call of the open sea" for suppliers (Chapters 1 and 5). New suppliers from America, mainly, USA (since the early 1950's for grain) or Brazil (meat), or East Asia (China) can debilitate the EU's leading traditional food markets. Besides, the weakness of the Euro-Maghreb logistic networks can attract American and Asiatic big logistics groups that could be interested in growing into the Western Mediterranean market. These two facts can be considered as a geostrategic threat for the regional integration, especially if the EU and the rest of Med countries fail in promoting an agricultural development that improves food security (Chapter 6).

Portugal shows the economic potential of a special geographical position and a trading history with a logistical progress. Although the commercial relations with the Southern Mediterranean countries are limited, its trade is intense – especially with the Portuguese speaking countries Brazil and Angola –, and the expanding markets of olive oil, wine and fish, are due to the recent development of infrastructure and the implementation of public and private strategies to encourage the modernization of logistics chains (Chapter 22).

Another factor that might affect the Mediterranean countries' trade and logistics is the food miles concept. This concept tries to incorporate the damage caused to the environment depending on the distance that a food product travels between its production place and where it is consumed. In developed countries, consumers are increasingly aware about the impact food produced far away might have. This trend favors the local suppliers and short circuits. It also affects logistics innovations like the reduction of packaging, the intensification of flows of "return" and the development of recycling (Chapter 27). There are no specific policies already applied related to food miles but some of them might be implemented in the future, and developing countries should be aware of it (Chapter 25).

Most national governments are conscious of the challenge of improving logistics and have started to take measures. It is, for instance, the case of Egypt, where especially local farming systems need to be improved – although instability problems in the country make these projects difficult (Chapter 21); Turkey, that has adopted since 2000 a policy of trade liberalization focused on the services sector and oriented towards the South-South trade (Chapter 17); or Malta, a logistical Mediterranean hub in the heart of the Mediterranean, very dependent on food imports and energy coming from overseas (Chapter 20). Other countries, like Albania, are still having many weaknesses in spite of the progress made since 1900's with programs like the "Digital Albania Program". The focus on agro-food logistics and investments in infrastructure is among the priorities of the Government for the coming period of 2014-2020 (Chapter 18).

But designing and making efficient logistic networks is not only an international and national issue. Regional and local authorities with territorial collectivities have an increasing role in the design of the future plans and models of transport and logistics to make their territory more competitive within the great infrastructure networks. They also manage the urban logistics and are responsible for the "last kilometer", which is the last step in the distribution chain, so they are key actors in the transport policy design (Chapter 27). They should all participate in the Euro-Med research and cooperation logistic and transport programmes.

Agro Technoparks are still too novel in the South but their growth can help firms to improve competitiveness and to attract foreign direct investment, including in logistics. No wonder Agro Technoparks are becoming a preferred option for Euro-Med governments seeking to foster innovation in the agro-industrial sector. The Middle East and North Africa (MENA) region has embraced this development tool in the past decade and many interesting experiences are currently under operation or in various stages of design and development – Morocco, Tunisia and Algeria are relatively more developed (Chapter 26).

The "Ortofrulog" project is aimed at the realization of an innovative logistics platform prototype – based on the use of ICT – for fresh and fresh-cut fruits and vegetables national production targeting both domestic and international markets. The "Magazzino Viaggiante" project implements a multidisciplinary approach for the development of a new logistics concept and for an Integrated Supply Chain Management. It proposes an innovative management model for SME supply chains, with the aim of coupling intercompany competition and cooperation. A Supply Chain Integrated Approach can help to implement new integrated technologies inside of the supply chain, permitting an advance in the level of knowledge and management of food quality and safety. The result can valorize and enforce the image of the Mediterranean products (Chapter 28).

Institutional opportunities. Towards a more integrated Mediterranean Region

The Mediterranean integration involves trans-boundary challenges that require long-term geopolitical ambition, solidarity and a concerted action among all the neighboring countries. Logistics will play a crucial role in this regard because without better food logistics, the future regional trade growth and economic integration will be hampered. To sustain and promote new initiatives in this field, a more substantial and institutional effort must be made at regional level, but also in every state.

What is promising is that Europe increasingly considers the Southern and Eastern Mediterranean countries as valuable trade partners and investment targets, given their population size and age structure, and the actual GDP and market potential (Chapter 15). The Euro-Mediterranean partnership today and, the Euro-African integration tomorrow, push in favor of trade growth by virtue of the interregional complementarities around and beyond the Mediterranean where geographical proximity still matters (Chapter 5). Estimates indicate that exports to and

imports from the EU region could triple or quadruple if Euro-Mediterranean countries reached the level of trade integration observed in the former EU-15 countries.

However, strong cultural, social, political and economic differences remain between the North and the South of the Mediterranean since the fall of the Roman Empire that involved a divide between the two shores of the Basin. History explains the divergent paths followed by Europe and the Southern Mediterranean region. Although, in the context of a new and more balanced political framework, it is time for Mediterranean countries to overcome their political rivalries and cultural differences towards a regional integration.

This becomes even more urgent with the Mediterranean role in the global logistic world being challenged by the uncertain situation imposed by the aftermath of the Arab uprisings and the political and social transformation aiming towards more democratic and open societies in many countries.

To overcome these challenges, cooperation and integration in sectors like marketing, transport and logistics should be considered as strategic goals for all governments in Europe and in the Mediterranean region. A joint effort towards the creation of a more stable, secure and prosperous space through these tools is the best way to establish bridges and promote a new common framework.

This could take the form of, as an example, developing a Mediterranean component of the AMIS system (Chapter 8); creating a Euro-Med Logistic Agrifood Community (Chapter 6) and harmonizing trade standards, given that the private sector has developed standards for the governance of food safety and quality in global agro-food value chains (Chapter 23). All these programs require logistics to be introduced into the Euromed Dialogue and multilateral cooperation in the region.

The meeting of Transport ministers from 43 countries of the Euro-Mediterranean area held in Brussels, in November 2013, to confirm and boost cooperation in the sector goes in the right direction. In this Conference, Ministers agreed on the priorities and guidelines for future cooperation on regulatory reforms and convergence, the development of the Trans-Mediterranean Transport Network (TMN-T) and its future connection to the Trans-European Transport Network (TEN-T) and the challenge of funding of the development of the TMN-T.

These public plans require also cooperation between private firms. Trade facilitation –improving both hard and soft infrastructure such as logistics and quality services, mainly in ports – should be in the core of a Mediterranean trade and transport policies. In this field, the EU could encourage a regional approach to good logistics practices – like the Guarantee Trade Mark of Valencia Port, in Spain, that could be implemented by other Mediterranean ports.

To promote and finance the agenda of innovative logistics, the role of the Middle East and North African countries – and the Arab countries in particular – is becoming

relevant. Beyond their political influence, some of them have an abundance of financial resources that could be invested in infrastructures, from energy and water to transport and logistics.

Last but not least, at the national level, a new territorial logistic approach is also needed in order to develop the remote and rural regions, create jobs and to fight against food insecurity. All this requires a better connectivity between the territories based on logistics and infrastructures at a time when the world is going through the restructuring of its geoeconomic and agricultural balance.

BIOGRAPHIES

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Nils Beaumond (chapter 12) is a veterinary doctor with an MA in Management and Human Resources Development (HRD). He started to work as a practitioner in France and gained various experiences in livestock farming and animal health during long term visits in Africa, Asia and Australia. He was a product manager at Pfizer from 1986 to 1988. From 1988 to 1998, he worked as a consultant to GIRA, a strategic and prospective market research company specialised in animal production where he coordinated several international studies in the field of livestock and meat production as well in veterinary product marketing. He joined Interbev, the French Meat and Livestock Association in 1998 where he worked as an international relations manager. He was in charge of communication in countries targeted by French livestock and beef exporters, and in charge of the company's public relations. Nils Beaumond was the secretary of the International Meat Secretariat Animal Welfare Committee from 2004 to 2010. Since 2012, he works as a consultant.

Rym Ben Zid (chapter 2) is an agricultural engineer specialising in horticulture and agricultural development. In Tunisia, she has participated in various studies including strategic ones like the study on the competitiveness of agricultural products during the negotiations of the free trade agreement with the European Union. She was a Humphrey Fellow (Fullbright) at Cornell University before working for different international organisations (FAO, FIDA, UNOPS, BAD, etc.) participating in or leading agricultural projects preparation or evaluation missions in Sub-Saharan Africa, the Middle East and North Africa. She has also participated to the multi-actors process of the International Assessment of Agricultural Knowledge, Science and Technology (IAASTD). Rym Ben Zid joined the FAO Investment Centre (Africa Service) in 2010, where she works as an agronomist. She has participated in the formulation of the pilot action plans in the framework of the European Neighbourhood Programme for Agricultural and Rural Development (ENPARD) in Tunisia.

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David Raphaël Busuttil (chapter 20) attended the University of Malta and the Sorbonne University, where, after reading Anthropology and History, he delved into International Relations, with a special focus on Geostrategy. Based in Malta, he is a director on the board of several companies and is active in the business development of one of the most prominent Maltese groups of companies. He is Chairman of The Currency Cloud (Malta) Ltd. and is a director of a number of consultancy companies. He currently holds the post of Executive Director at the Fondation de Malte, chairs the Steering Committee of the Malta Association of Human Rights, the local representative of the Paris-based International Federation of Human Rights Leagues (FIDH), and is President of the Alliance française de Malte-Méditerranée. He has contributed to several articles in academic publications. In 2010 he was awarded the "Chevalier de l'Ordre des Arts et des Lettres" by the French Republic.

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Gianluigi Cardone graduated in Agricultural Science from the University of Bari, Italy – Faculty of Agriculture. As an agricultural economist, he is a consultant to the CIEHAM-MAI Bari and employed as an agronomist at the Consortium of defence and exploitation of the intensive productions, environment and rural territory of the Province of Bari. His fields of interest include research and training in organic agriculture and rural development, the support to the policies for regional rural development and the extension of assistance service to local farmers.

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Philippe Chotteau (chapter 12) is an agricultural engineer (AgroParisTech 1981) specialised in economy and rural development. He is currently the head of the Economics Department of the *Institut de l'élevage*. The *Institut de l'élevage* is a private R&D institute and a reference for ruminant livestock farming in France. In this framework, Philippe Chotteau has conducted assessments of the meat and dairy chains in more than 25 different countries in the five continents. He has directed several studies for the European Parliament (*Future of the Sheep/Lamb and Goat Sector in Europe*, 2008; *The Impact of Increased Operating Costs on Meat Livestock in the EU*, 2009) and participated in several evaluations for the DG Agri of the European Commission (*Direct Supports for the EU Beef Sector*, 2010; *Evaluation of Market Measures in the EU Beef Sector*, 2007; etc.). He is co-author of the book *Vaches d'Europe* published by Economica (1995).

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Antonio Felice (chapter 9) is a professional journalist specialised in business and economy since 1979. In 1987, with some colleagues, he founded the publishing house Gemma Editco in Verona, Italy. In 2006, he founded the *GreenMed Journal*, a project focusing on the Mediterranean agricultural economy, typical Mediterranean fresh products and the market's protagonists. Its main goal is to promote Mediterranean typical products and Mediterranean culture and way of life across the world. Antonio Felice is the current project manager of the *GreenMed Journal* and the GreenMed Forum.

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Cosimo Lacirignola is an agro-economist and graduate of the University of Bologna. He has been entrusted the position of Secretary General ad interim of the CIHEAM since October 1, 2013, at the request of the 13 member states of the Organisation, with which he is an agent since 1983. After having been an official of the European Commission from 1982 to 1983, he became principal administrator of the General Secretariat from 1983 to 1987, when he became Director of the CIHEAM-IAM Bari. This professional background has allowed him to gain extensive experience in the field of scientific and technical cooperation in the Mediterranean, developing numerous training and research projects and being at the heart of high-level regional diplomacy. He has also acted as advisor for international relations to the Ministers of Agriculture of three different Italian governments. He was also head of the International Relations Office of the Italian Ministry of Agricultural, Food and Forestry Policies (MIPAAF) from 1998 to 2000, then from 2002 to 2006. In 2002 and 2003, he was the focal point between the Italian government and the European Commission in the framework of the preparation of the Euro-Mediterranean Ministerial Conference, held in Venice on 27 November 2003. He

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Audun Lem (chapter 10), qualified economist, has been working at the FAO Fisheries and Aquaculture Department since 1996. In December 2011, he became coordinator of the Products, Trade and Marketing (FIPM) Service and in 2012, he was appointed secretary of the FAO Sub-committee on Fish Trade. Audun works on a wide range of issues including international trade and the WTO, multilateral and bilateral trade agreements, the role of aquaculture in the price indexes of international trade, commodity market development and the supply chain. He also coordinates the FAO GLOBEFISH Project, providing information on trade and market analysis especially on international seafood markets. Audun received his Masters in Business Administration from Harvard University and his PhD in industry development in transition countries.

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Mara Semeraro, graduated in Agricultural Science and Technologies in 2000, has 12 years of working experience in the field of food quality, especially in the sector of fresh fruits and vegetables. Since 2003, she works as an agricultural consultant at the CIHEAM-MAI Bari where she provides technical support to the design and implementation of cooperation and development projects funded by the Italian Ministry of Foreign Affairs, the Italian Ministry of Agriculture and the European Commission in Mediterranean countries. She has a significant experience in Malta and in Egypt within the SPIIE project and knows the Egyptian fresh horticultural sector very well. Since 2013, she is working on the development of traditional and quality products.

Marco Spinedi (chapter 15) is currently a senior advisor to Mode Consulting in Rome in transport and development economics and policy. He has a significant experience in applied economic analysis with a special focus on regional development and on transport and logistics economics and policy. For about 20 years, Marco Spinedi has been a consultant to railway companies, port authorities, container terminals, airport companies, as well as international and national institutions and bodies. As a visiting professor at the University of Bologna, he covered a number of teaching assignments in development economics and policy, logistics and transport policy, international organisations. For 14 years, he also worked as a development economist with the FAO – Food and Agriculture Organisation of the United Nations – and participated in various assignments for the Agriculture and Policy Analysis Department, in Rome and in Africa. More recently, he was involved in a number of international projects related to the process of globalisation of freight maritime and land transportation and logistics industry in Central and South-Eastern European countries, the Mediterranean and the Far East.

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