

# Recent changes in world system of shipping under cold conditions and their impact on Moroccan agri-food exports shipping.

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## Abstract:

Since its appearance, the container continues to revolutionize the classic pattern of maritime transport. Despite its limited share of the global market of maritime transport, the transport sector of perishable products under cold conditions has undergone deep changes after the integration of the conditioning mode by reefer container. Quickly, because of the success of this metal box, governments and conventional ship-owners of polythermal ships were forced to revise their strategies.

The analysis of the flow of fresh agri-food products exports of Morocco, and specifically the port of Agadir that represents the major reefer port terminal of the country, reflects the magnitude of sudden changes in the logistic chain under cold conditions.

**Keywords:** maritime transport, export of perishable, Containerization, Morocco, Agadir.

## 1- Introduction

Among the direct results of the great geographical discoveries and the widespread colonization, a large market of fresh food consumption of temperate and warm areas of our planet appeared at the level of the most developed countries. The technological innovations realized in the shipping sector at directed temperatures have favored the growth of exports of such perishable products from the southern hemisphere and from the Mediterranean to Europe, North America, and the Far East. The experts of the sector are unanimous that the world system of shipping under cold conditions still maintains its great power of creating new markets of consumption, and consequently increased flows refrigerated exports.

In the current context characterized by the acceleration of the phenomenon of globalization, the same as the deep changes of the global world maritime transport system triggered by the widespread containerization process (Fremont A. 2007, Mr. Levenson 2010), the maritime transport under cold conditions has experienced quite deep changes. Since the appearance of reefer container and its permanent modifications for the treatment of perishable products, the integration of this new conditioning method has become a serious challenge for the different actors in the logistic chain of products under cold conditions in the sea and the continent.

With the aim to have a better integration in the new configuration of the maritime transport system in cold conditions created by containerization, exporters, importers and services suppliers of the shipping sector have entered in a repositioning process of their activities. Significant changes have affected different segments of the logistic chain of refrigerated shipping: the port legislation reform and heavy infrastructure are made by governments to attract private sector actors, handlers were forced to make their services more attractive by reducing time and cost of port passage, however ship-owners have had to make the freight rates and the transit time more efficient even if it required to redesign the ships used in the conditioning of perishable products.

In this situation that has also experienced the arrival of major shipping companies owning giant container ships to take advantage of the best added value offered by the reefer container, the conventional operators holding a large polythermal fleet, have suddenly found themselves in a dilemma either to change the logistics strategy or to abandon the refrigerated shipping market. In recent years, orders for acquiring new polythermal ships have

almost stagnated, on the other hand conditioning by reefer container has made impressive advances.

In Morocco as a Mediterranean country exporting perishable agri-food products, these changes occurred in the global system of cold conditions maritime transport have not taken place without impacts. In addition to the gradual adoption of reefer container, the actors of the sector of the exports of food products of agricultural and fisheries origins, try to use the advantages of this type of conditioning to enhance their positions in the traditional destinations, and also to conquer new markets in far countries.

Representing the main reefer port terminal in the country, Agadir port case illustrates well the impact of the global system of maritime transport mutations under cold conditions on the functioning of the Moroccan port system.

## 2. Methodology and sources of information

Globally, it is recognized that the characterization, in a clear manner, of maritime transport of fresh agri-food products flow is a subject of great complexity. The major constraint that stands before researchers lies in the nature of existing databases whose structures are inadequate to specification requirements of different trades of these foodstuffs generally intended for human consumption.

Virtually, all major international organizations working in sectors of agri-food production, transport or international trade, such as the FAO (Food and Agriculture Organization), UNCTAD (United Nations Conference on Trade and Development), WTO (World Trade Organization), UN Comtrade (United Nations Commodity Trade statistics Database) ... publish statistics on a regular basis, but without giving details on the nature of exported or imported fresh products, or on their ways of transport.

In this context, the data produced by the shipping companies and port actors are the most accurate, but generally they are inaccessible to researchers, mainly for reasons of competition in the reefer shipping market.

The existing data on the theme of reefer shipping are compiled and disseminated by specialized international consulting firms as Dynamar, Drewry and Lloyd's. The flow of information from the reports and analyzes of these organizations remains limited among researchers, the acquisition costs of these documents remain high.

At the national level, the main source of information on maritime transport in Morocco is represented by the ANP (National Ports Agency) as

a state port authority managing of the entire country trade port system. Another source is represented by Tanger Med Port Authority (mtpa) responsible for the management of transshipment hub Tager-Med.

The ANP publishes regularly summary reports on port activity, as well as monthly statistics panoramas on overall traffic by port, according to the forms of conditioning of exported and imported goods. In these documents, the fresh or processed agri-food products are integrated into the solid or dry bulk, the category classified as "citrus and early fruits and vegetables" is rarely specified.

The summary data provided this agency are often included in reports and publications of different government departments and services. Morocco's Statistical Yearbook published annually by the HCP (Haut Commissariat au Plan), is a good example in this sense. For more specific information, it was necessary to make contact and conduct interviews with actors having direct contact with the export of agri-food products. This is the case of de l'Établissement Autonome de Contrôle et de Coordination (EACCE), responsible for ensuring the product compliance with the standards of international markets, and it is also the case of Mersa Morocco, a company of handling, that is very present in the docks of commercial ports in Morocco.

## 3 Results and Discussion

### 3-1 The global reefer shipping

#### *The reefer load, high added value niche*

At a worldwide level, according to consultant Dynamar, the global marine traffic of merchandises under cold conditions has reached more than 100 million tonnes in 2014. This volume is only 1% of the total weight of the maritime traffic that reached, that same year, 9.8 billion tons (UNCTAD. 2015, p.6), and only 2.7% of merchandises traffic off liquid and dry bulk (hydrocarbons, minerals and grains).

In spite of the modesty of its volumes, the reefer shipping is a niche market of great interests for many actors, the case of agri-food products covering 4/5 of this market (Drewry 2014) is very significant. Without the reefer shipping, it would be unimaginable to supply the major markets of the northern hemisphere with fresh agri-food products from distant production basins

According to expert analysis, this specific transportation market is in full expansion and its future prospects are quite promising. The volume of fresh products transported by sea is steadily increasing, it has reached more than 105 million tonnes in 2015 against only 92 in 2012, an annual

growth trend of 3% is achieved since 2000 (Vaal F. 2015 and Dekker N., 2014).

In parallel with the growth of treated fillers, the world total value of such exports rose from \$ 156 milliard in 1999 to 436 in 2013 (UN Comtrade).

**Structures of reefer shipping of agri-food products**

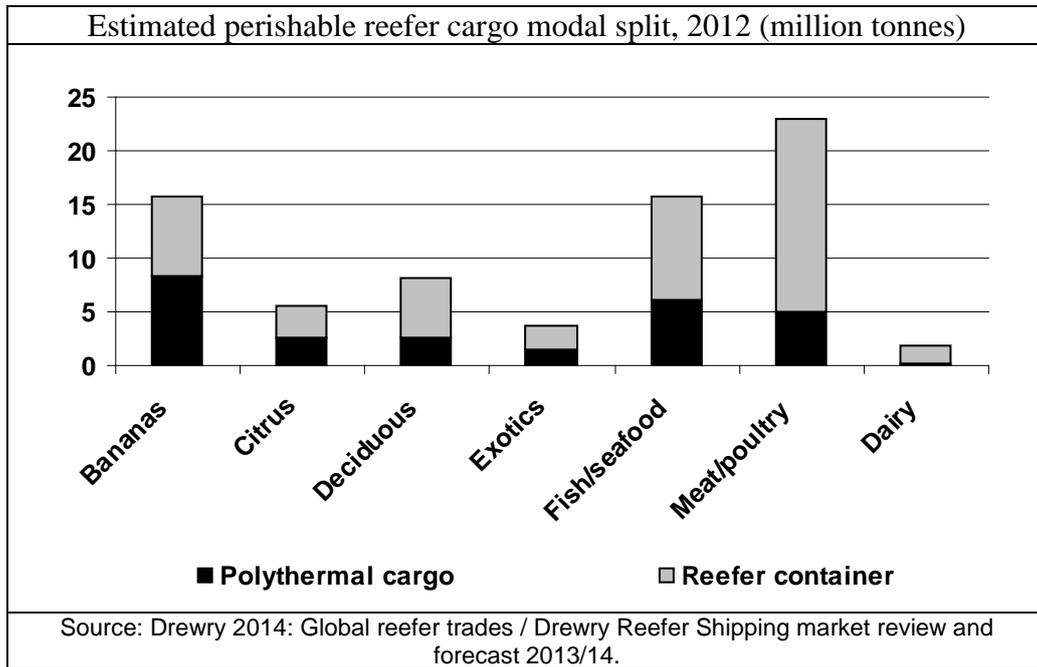
The reefer shipping of agri-food products is dominated by fruit and vegetable group. On a total handled volume of 74 million tonnes treated in 2012 this group represented a proportion of 45%, which is 33 million tonnes. Bananas are the main sector with around half of the total volume of exported fruits and vegetables (17.3 Mt), the rest is shared by citrus, exotic fruits, crops of temperate countries and vegetables (Dekker N., 2014). The latter offers to transport companies a volume of around 28.6 million tonnes to load consists of: onions and leeks (7.1 Mt), potatoes (4.7 Mt) and tomatoes (4 Mt) (foulquier E. 2016, p. 263).

The sector of meat and dairy products comes in second place with a share of maritime transport market of 34%, followed by the sector of seafood

which concentrates 21% of the volume of this market.

The reinforcement of the concerned maritime flows under cold conditions revolves around three major axes of south-north direction. These shipping axes connect the main agri-food production homes represented by Latin America, South Africa and Australia, to the three major centers of consumption that are North America, Europe and the Far -East.

This scheme is to be completed by a west-east flow between Europe, the Far East and North America, as well as the maritime reefer network linking the Mediterranean countries to the markets of European countries. Due to the proximity of markets to be served, a large part of the exports are mainly transported by the road from countries like Morocco, Spain, Italy and Turkey. However, this situation is changing in connection with the promotion of maritime transport to reduce emissions of greenhouse gases generated by road traffic in Europe. In recent years, in this context, The " Sea Motorways Program" has begun to attract the attention of the major ship-owners to set up a network of inter-Mediterranean regular shipping (El-Mahdad H. 2016).



Virtually all the traffic for exports of agri-food products in cold conditions is now adopting the method of conditioning by reefer container. The polythermal ships still continue to be used in the sectors of bananas and seafood.

**3-2 reefer shipping conditioning between conventional ships and container**

Maritime transport of agri-food products is a specific activity, it offers services corresponding to characteristics appropriate to each product and its perishability. These services generally involve an ambient temperature, from -2 to + 15 ° C, needed for products to keep their freshness or a freezing at negative temperatures down to -35 ° C to extend the product preservation. Cold transportation increases the shelf life of the goods in terms of maintenance

of a mix of ambient air and eliminating damage risks, contamination or odor absorption.

Since the end of World War II, the increase in world demand for perishable agri-food products has been important enough to push the shipping operators to develop a fleet of ships at directed temperatures. The sector high added value pushes carriers to constantly improve their skills in the field of cold chain. After the innovation of conventional polythermal vessels, designers have invented the insulated container (Conair) then the reefer container with a real-time follow up of cargoes' temperatures. For a good life cycle control of merchandises along the transport way, shipping companies offer customized programming of temperature variations, ventilation and humidification of the ambient air.

The arrival of the reefer container of different sizes has transformed the shipping of agri-food products at directed temperatures around the world. It can be loaded on any ship with sufficient socket for the operation of its autonomous refrigeration system. As it can be easily handled at port terminals equipped with single electrical terminals to avoid any break in the cold chain.

Imposed in a context of globalization of trade and an increased size of marine traffic, the reefer container is now expanding its position in the maritime transport at directed temperatures to the detriment of conventional polythermal vessels in continuous regression. Before the hegemony of the companies owning the giant container ship that offer an growing number of cells for reefer containers, the companies holders of polythermal ships were forced to change their strategies: reducing shipbuilding orders, neglecting older ships, equipping the in service ships for receiving reefer boxes on their deck, the acquisition of specialized containers holders, the merger in competitive alliances ... the small state ship-owners usually chose to be dissolved by privatization.

The slowdown in investment in the acquisition of new reefer ships and the dismantling of old ships have consistently reduced the sector global capacity of load. This capacity that reached its maximum of 390 million cubic feet (cuft) in 1994, was rapidly

reduced to 310 million in 2006 cuft (Tourret P. 2006) then to 203 million cuft in 2015. The world fleet of polythermal ships passed from 1,200 units in 2006 to only 624 in 2015. In the opposite, the supply of world capacity of reefer containers has grown steadily to more than six times that of reefer ships. The  $\frac{3}{4}$  of perishable goods are treated with this type of conditioning (Waals F. 2015).

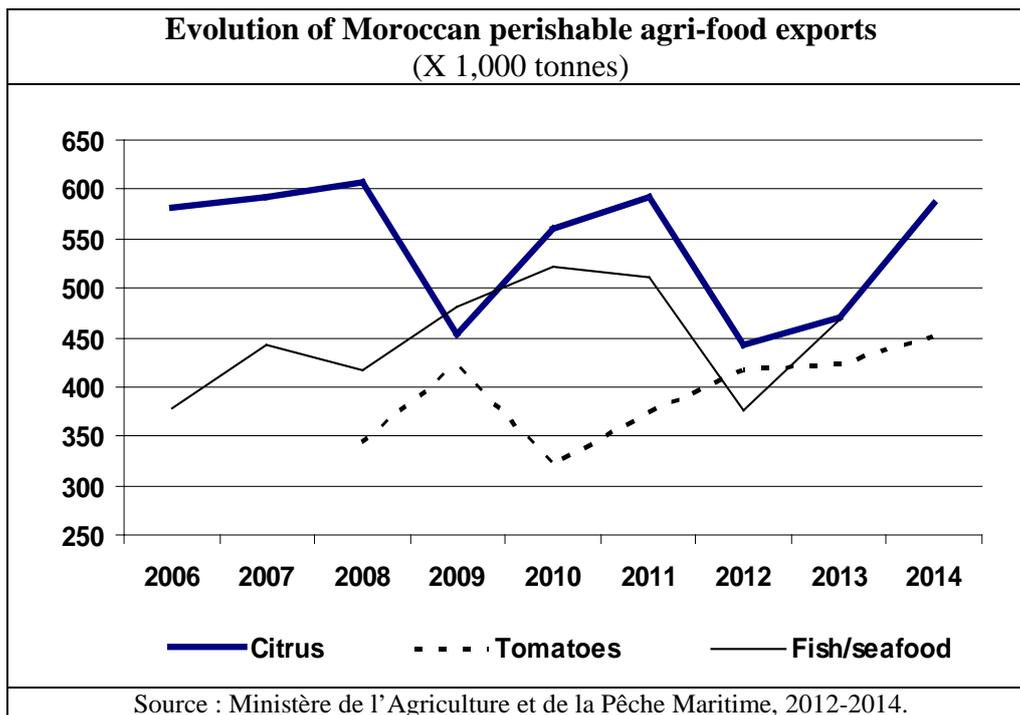
### **3-3 Morocco, an export basin of perishable products**

#### ***The agri-food export sectors***

The French and Spanish colonial powers installed in Morocco in 1912 quickly highlighted the possibility of mobilizing the potentials of this country for the development of the export of agri-food products to the European market located a short distance. Quickly arrangements are made for the mobilization of water resources, the improvement of agricultural land, the construction ports ... priority was given to two sectors in the colonial economic project, it consists of the modernization of the irrigated agriculture and the development of the exploitation of fishery resources.

After independence, the Moroccan economy has continued to rely on these two strategic sectors with high potential for job creation, revenue generation of foreign exchange and supply the local market. Irrigated agriculture and sea fishing are always highlighted in different national development strategies. Today two major ambitious plans are being implemented: the Green Morocco Plan and Halieutis Plan.

The Moroccan agricultural products contributed by over 15% of total goods exports of the country in 2013. They are dominated by two key segments, citrus and market gardening. They generated an average annual export volume of 1.230 million tonnes during the period 2007-2013: citrus 530, tomatoes 400, vegetables 300. For the latter sector it is mainly potatoes and green beans among others (Ministry of Agriculture and Maritime Fishing, 2014).



For seafood, the wide opening of Morocco on the Mediterranean and the Atlantic made the country a "fishing power" worldwide. The potential annual production is estimated at 1.5 million tonnes of renewable fish. The opening of fishing to foreign fleets through economic agreements with foreign countries, has not prevented Morocco to reach an average annual catch level of 1.1 million tonnes during the period 2008 -2013, 40% of this production that is approximately 500,000 tonnes is exported (Ministry of Agriculture and Maritime Fishing, 2012). In the near future, the exports volume of these products will know a significant outburst in relation to the implementation of actions under the National Aquaculture Development Plan.

Generally, the European Union market continues to be the main destination for these Moroccan exports at directed temperatures. To escape the strong competition in this area, market diversification attempts by developing exchange agreements allow transporting agri-food products "made in Morocco" to different markets around the world.

### ***Maritime logistics of agri-food products and its mutations***

In an aim to preserve the reputation of Moroccan agricultural products and support their competitiveness in the most demanding foreign markets, the Export Marketing Board (ECO) was created since 1965 under the Ministry of the Moroccan External Trade. Anxious to ensure a transport mode suitable to the specific agricultural products, this organization has relied on the sea,

especially that the option of the passage of the Moroccan products by truck on the Spanish ground to reach the European market was not possible at that time.

In this context, the OCE has promoted the participation of the national fleet in transporting fruit and vegetables. According to data available at the National Documentation Centre, in the early eighties this fleet was consisted of a total capacity of 3.3 million cuft offered by about fifteen refrigerated and palletisable ships monopolized mainly by the Moroccan Navigation Company (COMANAV).

The structural changes in the world economic environment, particularly the promotion of trade liberalization, enlargement of the European Union by the accession of competitor countries in the Mediterranean, the constant spread of shipping containerization... prompted the Moroccan government to end gradually the state monopoly in the field of port and maritime services. A series of deep reforms were pledged to clear the field for private initiative that has the flexibility to develop an integrated logistics management.

Since 1986, ECO has seen its monopoly significantly reduced to become a simple agent beside the large export centers federated by exporting producers. It is a question of Morocco Fruit Board (MFB) and Fresh Fruit Morocco (FFM) accumulating as an example 95% of the country's citrus exports.

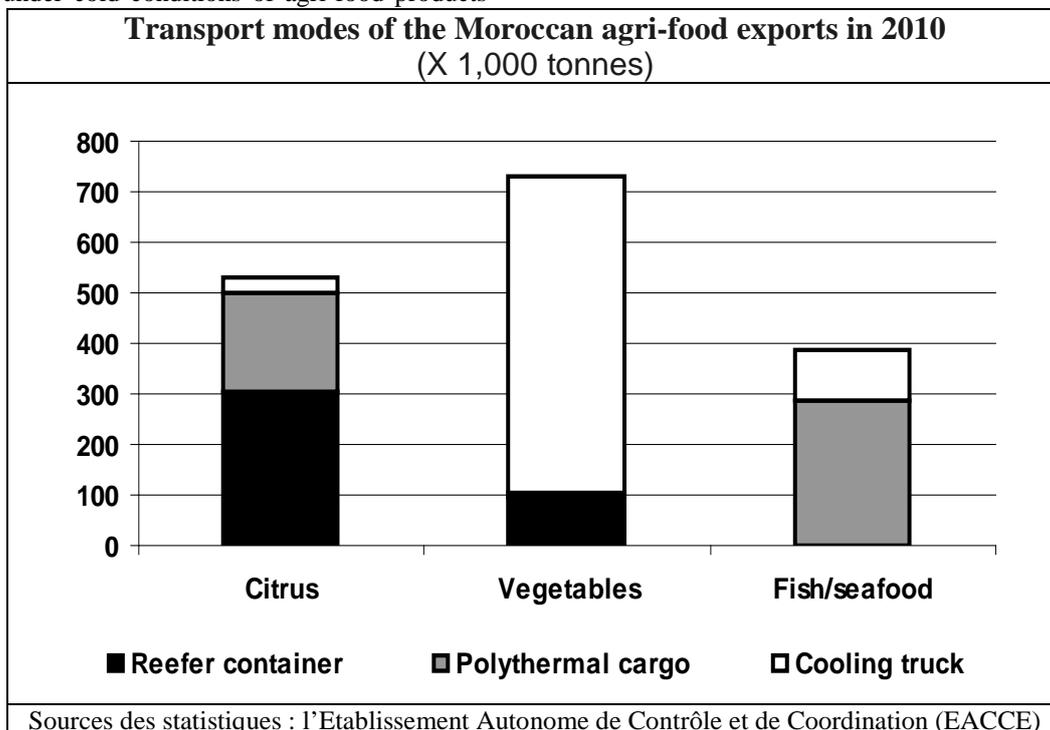
Thereafter, changes have directly affected shipping by achieving the following:

- The expansion of container ports in ancient ports of Casablanca and Agadir, with the arrangement of pitches with electricity for the reception of reefer containers;
- Separation of tasks of the port authority carried out by the public administration or delegated administration, and merchandise processing services to be offered by private bodies as part of a public tender;
- Administrative reforms aimed at increasing the flow of goods through the dematerialization of procedures and granting the status of Authorised Economic Operator (AEO) by the Administration of Customs to successful exporters;
- The putting of Tangier Med port into operation from 2007 onwards to be a world hub port connected to the world network of container traffic;
- The privatization of the national fleet COMANAV and encouraging the installation of big shipping companies with the ability to transport the Moroccan products worldwide through regular shipping lines at competitive prices ...

Currently, the data analysis of the activity of the EACCE of 2011 demonstrates that migration of the traffic under cold conditions of agri-food products

to reefer container is in a transitional phase. This migration takes different forms depending on the nature of the product:

- Citrus fruits are the most advanced in the choice of reefer container conditioning with the best logistics performance to reach distant markets. More than half of the Moroccan citrus are transported to the markets of Eastern Europe, some African countries, North America and the Middle East;
- The vegetable group began to move towards the reefer container, but it can not get rid of transport by refrigerated trucks. Consisting mainly of tomatoes, 90% of these exports goes to the European Union markets located near the production areas;
- Seafood still falls behind in integrating the containerization process. Exporters of conditioned products at negative temperatures in the form of frozen fish continue to use polythermal ships. On the other hand, the refrigerated truck is still used for supplying small importers of the European Union in fresh fish.



### 3-4 The port of Agadir, a reefer terminal in continuous metamorphosis

The Moroccan production of agri-food goods for export denotes a strong spatial concentration. The available natural resources and the know-how

developed over generations make the hinterland of the port of Agadir an area of agri-food export par excellence. Since the early 17th century, the site of this port has begun to operate for the catch and export of fishery resources after processing by salinization. Currently, after the development of the

operating activities of seafood and citrus and early vegetables agriculture, this hinterland generates on average more than half of national exports in citrus and early vegetables and 4/5 of exports of seafood products (EACCE).

In principle, the port of Agadir has been developed progressively to improve its performance for the competitiveness of these perishable exports in foreign markets. It started with a simple docking ramp for artisanal boats to currently reach a large port complex with a depth of up to -15 m (El-Mahdad H. 2016).

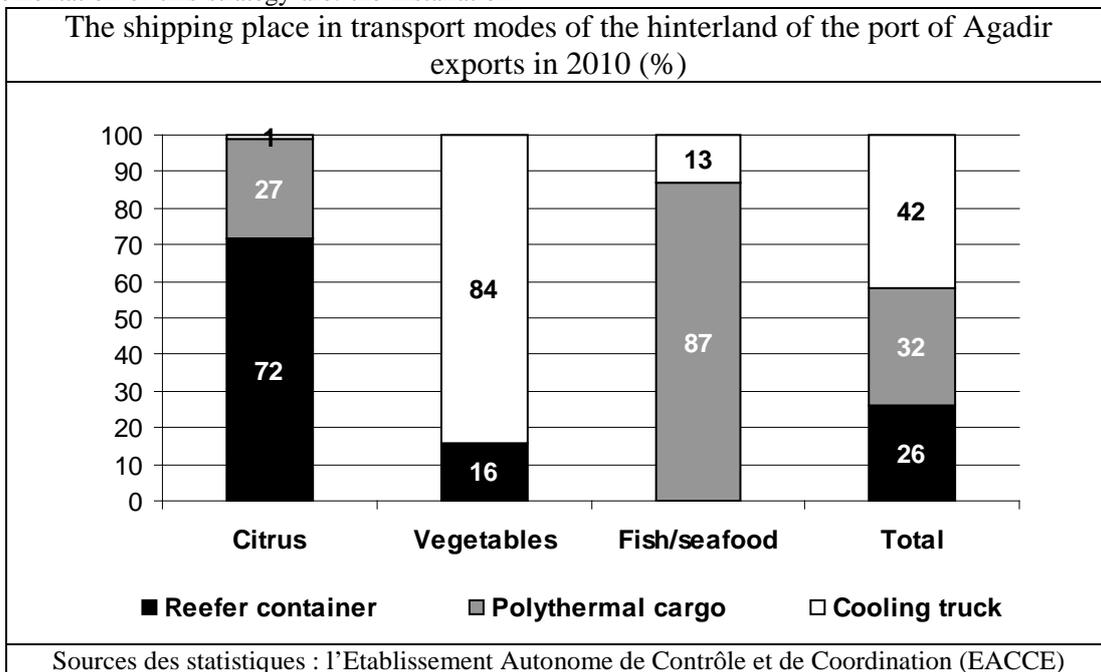
The processing of perishable products flow from the South of the country has imposed on this port to grow continuously as a specialized reefer terminal. Port actors have always reacted to align the infrastructure and the provided services with the level of innovation of shipping at directed temperatures. In addition to the transition to the palletizing and reception of the polythermal ships, the port is succeeding its transition to the reefer container processing services.

In order to find a place in the current context of the profound changes of shipping, the port of Agadir has adopted a gradual migration strategy toward reefer containerization. The indicators of the implementation of this strategy are: the installation

of the world leaders in the sector of reefer container such as CMA-CGM and Maersk, and the opening of new regular shipping lines to major platforms of perishable food marketing and to port transshipment hubs on dynamic coastlines in the Mediterranean and the North Sea.

The analysis of the loading of fresh and frozen products data, provided by Mersa Morocco, main ship handler confirms the new situation of this port. During the past six years, 2009-2014, the number of reefer loaded containers has progressed dramatically; the annual growth rate was approximately 40%. This number suddenly increased from 7,400 TEUs in 2009 to more than 44,000 TEUs in 2011, the threshold of 50,000 TEUs was exceeded in 2013. Towards this reefer container success, reefer ships shares were remarkably decreased.

Overall, the port of Agadir manage at present to sell about 2/3 of its hinterland exports of perishable agri-food products, almost the half is conditioned by reefer container. The rest still finds its way to the European Union markets primarily by refrigerated truck.



The reefer container mode remains the primary choice of citrus exporters to distant markets. Exporters of early vegetables category constituted mainly of tomatoes rely too much on road transport; it is the most suitable mode for the transport of small quantities of fresh vegetables directly to distribution platforms in Europe under the

framework of contracts. On the other hand, for seafood, although the reefer container has begun to emerge, most of the exports from this sector still prefer the polythermal ships as maritime conditioning mode.

In the absence of statistical data, it is to be noted according to the port actors on the spot that the port of Agadir has before him a promising future for the growth of its export flows of perishable products. The decisive factors for this trend lies in the plans being extended of irrigated areas and aquaculture activity in southern Morocco, as well as in the program of "highways of the sea" to reduce road traffic in Europe that will allow the sliding of a known volume of exports to the seaway.

To prepare for these changes, the port of Agadir has received a series of actions aiming at the improvement of its transit time. After the privatization of the handling of merchandises, the adoption of the information system "PortNet" aiming at the simplification of procedures and the generalization of Electronic Data Interchange (EDI) to all the operators of foreign trade, this port is candidate to receive a large expansion of its infrastructure under the national ports Strategy 20130 (Ministry of Equipment, Transportation and Logistics. 2011).

## Conclusion:

Maritime transport of perishable agri-food products under cold conditions has reached an ever realized level of service supplying in the history of the world economy, the reefer container came to reinforce this trend. By offering innovative technical advantages compared with polythermal vessels, this new conditioning method contributes to the acceleration of globalization by the widespread of tropical and off-season products consumption.

By increasing the cost of freight and its transit time, the container was able to cover a significant share of the flow of agri-food goods traded by sea, and it is imposing a new network of seaways enlivened by increasingly giant container ships.

To take advantage of this new economic windfall represented by containerization, some developing countries such as Morocco, are integrating their export economy of agri-food products in this new configuration of the marine transportation system under cold conditions. The changes occurred at the port of Agadir, a major national reefer port terminal, confirms this orientation.

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