

# **Parabellum: Making French ports more competitive**<sup>1</sup>

*Around the world, the movement towards greater automation of terminals has begun. Where does France stand in this movement?*<sup>2</sup>

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## **ABSTRACT**

With increasing volumes of goods, the world economy has never been so dependent on the sea than before. The main concern of developed countries is therefore to guarantee the safety of maritime transport and above all to optimize logistics operations within port sites.

Internationally, many countries such as China have been able to distinguish themselves with increasingly efficient ports. Innovating and improving the logistics organization of seaports has become a real challenge for them. Nevertheless, many authors question the management of ports in France. Some speak of the weakness of French ports in terms of containerization. Thus, France must review its port infrastructures in order to compete with other world powers.

**Key Words:** Container Terminal; Automation System; Barcode System; RFID System; Damage Container; Claims; French ports system; Dehumanization; Automated Operation; Gate complex; Transportation system; Competitive ports.

## **INTRODUCTION**

With the back and forth in restrictive measures - not to mention the shocks of the Suez Canal, Yantian and Ningbo - port services have deteriorated, and ship queues off the world's major container ports have lengthened»<sup>1</sup>. This is what we can find in the headlines concerning seaports. Harbors and port facilities have never been so stretched to handle the volume within their infrastructure.

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As a matter of fact, physical flows by sea have multiplied in the last decades with globalization. One of the reasons for this craze is the ease of buying products from abroad. In addition, the health crisis that we are facing since late 2019 has only accelerated this mode of consumption, but logistics activities within the ports have been slowed down due to government restrictions. As a result, consumers are increasingly demanding in terms of deadlines, but port sites have had difficulties managing international trade for over a year.

With this changing world, robotization and automation have become techniques used to optimize logistics flows in strategic points such as ports. The Asian continent has the most competitive ports in the world. The quantities handled are largely superior to those of the French ports. This gap observed in France is due to several factors: economic, territorial, or political. Therefore, we can raise the following question: **how to make French ports more competitive?**

In order to answer this question, we will first highlight maritime transport internationally and then in France via a literature review. Finally, in a second part, we will show how come the digital innovation is a catalyst for the transformation of French ports.

## **I- MARITIME TRANSPORT : AN EXPANDING SECTOR**

With globalization, states have accelerated their international exchanges in order to increase their economic growth. The maritime routes as well as the functioning of the world's ports have been modified in order to handle all the volumes exchanged. This is why it is essential to present this sector in the world before focusing on the activity of French ports.

### **a- IN THE WORLD**

The majority of the world's ports are facing increasing challenges in terms of competition and performance. Moreover, the economy relies as much on the internet revolution as it does on the ability of countries to master maritime routes and port interfaces.

Indeed, nowadays, 80% of trade in the world is carried out by maritime transport, so many countries have optimized the logistics organization within their ports. According to the transport geographer Y. ALIX and the economist F. CARLUER, the Asian continent remains the leader in this sector. Indeed, « *The Shanghai-Singapore duo handles thirty times more containers than the ports of Le Havre and Marseille* », and according to the latter, seven of the ten largest ports in the world are Chinese. The table below shows the ranking of seaports in the world according to container traffic in twenty-foot equivalent units (TEU). The parenthesis is a reference to the previous ranking (2019). The variation allows us to see the impact of the health crisis on container traffic in the ports.

Rang	Port	2020	2019	Variation
1 (1)	 Shanghai	43.501.400	43.303.000	+0,5 %
2 (2)	 Singapour	36.870.940	37.195.636	-0,9 %
3 (3)	 Ningbo-Zhoushan	28.734.300	27.535.000	+4,4 %
4 (4)	 Shenzhen	26.553.000	25.771.700	+3 %
5 (5)	 Guangzhou-Nansha	23.191.500	23.236.200	-0,2 %
6 (7)	 Qingdao	22.004.700	21.010.000	+4,7 %
7 (6)	 Busan	21.813.073	21.992.000	-0,8 %
8 (9)	 Tianjin	18.356.100	17.300.700	+6,1 %
9 (8)	 Hong Kong	17.961.000	18.303.000	-1,9 %
10 (10)	 Los Angeles / Long Beach	17.326.720	16.969.666	+2,1 %
11 (11)	 Rotterdam	14.350.000	14.810.804	** -3,1 %
12 (12)	 Dubai / Jebel Ali	13.486.000	14.111.000	-4,4 %
13 (13)	 Port Kelang	13.243.741	13.580.717	-2,5 %
14 (14)	 Anvers	12.031.469	11.860.204	+1,4 %
15 (15)	 Xiamen	11.405.000	11.122.180	+2,5 %
16 (18)	 Tanjung Pelepas	9.800.000	9.077.485	+8 %
17 (16)	 Kaohsiung	9.621.667	10.428.634	-7,7 %
18 (17)	 Hambourg	8.750.000	9.282.012	** -5,7 %
19 (20)	 Laem Chabang	7.546.494	7.980.560	-5,4 %
20 (21)	 New York / Newark	7.585.819	7.471.131	+1,5 %
21 (23)	 Hô Chi-Minh Ville	7.200.000	6.848.360	** +4,9 %
22 (22)	 Colombo	6.850.000	7.228.337	-5,2 %
23 (24)	 Jakarta	6.170.468	6.802.200	-9,3 %
24 (31)	 Tangerang Med	5.771.221	4.801.710	+20,2 %
25 (26)	 Yingkou	5.673.100	5.480.000	+3,5 %

Figure 1: Top 25 global container ports in 2020

The ranking in the table above shows that none of the 25 most competitive ports in 2020 are French. The first 9 ports are Asian with a traffic of over 17,000,000 TEU. The port with the highest traffic in Europe is Rotterdam with only about 14,000,000 TEU. Having already significant volumes to handle in 2019, we see that the health crisis has often increased traffic in 2020 for these global ports. However, these ports have managed to handle all the flows thanks to automated equipment for loading and unloading but also cranes on gantry or even vehicles. Also, the technology used for the systems has been developed reducing labor costs by 70% while increasing productivity by 30%.

Other Asian ports are developing, such as Guangzhou, which has concluded a partnership with Huawei to use 5G. The vision is to develop a smart port and have the first fully automated terminal in the region.

In Europe, the port of Rotterdam with 400 million goods handled per year is the most competitive. It, too, has automated equipment where almost all of its employees are in the control stations. For example, according to a broadcast by TF1 (French television) in 2008, three people are enough to supervise the loading of five ships simultaneously in Rotterdam.

We can see that maritime transport is a growing sector in international trade. Thus, the states want to transform their port sites by using automation or robotization techniques. The goal is to reduce labor costs and especially to increase the productivity of these infrastructures as in Shanghai or Rotterdam. Others also want to use these innovative systems as in the case of France, which is why we will now describe the port activities in France.

### **b- IN FRANCE: FRENCH PORTS ACTIVITY**

France has the second largest maritime domain in the world after the United States. This maritime domain called EEZ (Exclusive Economic Zone) extends over approximately 700 000 km<sup>2</sup> and constitutes the maritime space over which France exercises its sovereign rights.

The EEZ allows France to be present on almost all the seas and oceans of our planet thanks to its ultra-marine territories called "overseas territories" such as Guadeloupe, Guyana, Martinique, and Reunion.

The French maritime space should normally be an advantage allowing it not only to weigh on the world maritime transport but also to use this asset to innovate and create its own network (its own conception) of maritime transport.

In terms of trade, France has 66 commercial seaports, 12 of which are state seaports. Of these state seaports, 11 stand out as GPM (Grands Ports Maritimes) and one, Saint Pierre et Miquelon, is a port of national interest.

In addition to the four ports of Guadeloupe, Guyana, Martinique and Reunion, there are 7 GPM in mainland France:

- The port of Rouen, which is the leading grain exporting port in Europe and the leading French port for the agro-industry.
- The port of Le Havre which is the leading French port in terms of foreign trade (1st French import-export platform) and container traffic (66 million tons of goods in 2019).
- The port of Dunkirk, which is the leading port (in France) for the import of fruit and vegetables and which will be the outlet for the Seine-North Canal project linking the Oise to the Dunkerque-Scheldt Canal.
- The port of Marseille Fos which is the first port of hydrocarbons in France and the first cruise port in France.
- The port of La Rochelle which is the first French port for the import of forestry products and paper pulp.

- The port of Nantes Saint-Nazaire which is the first port of the Atlantic coast.

Since June 1, 2021, the river and seaports of Le Havre, Paris and Rouen have joined together to form a single establishment "HAROPA PORT". They will thus form a major river-sea port on the Seine axis with a view to gaining market share in Europe. The aim is to offer a complete, multiple, diverse but above all unique service with a view to optimizing the supply chain.

The Seine Nord Europe Canal project is in the same path as the HAROPA project. By creating a missing link between 'Compiègne' and 'Aubencœur-au-Bac', it will be easier to provide a service to Paris as well as to the major cities of Belgium from Dunkirk by waterway. The port of Dunkirk will thus be able to increase its commercial outlets, compete with the port of 'Envers' and contribute to the development of the Upper France region.

Although lagging behind northern European ports such as Hamburg, Rotterdam and Envers, some French ports have chosen to take the bull by the horns by innovating to become competitive. Thus, the ports of Le Havre and Marseille Fos have decided to equip themselves with ultra-sophisticated digital tools. This involves automating processes, simplifying traffic and speeding up exchanges.

"They use port software (Cargo Community System) that connects the various players in the port chain, such as shipowners, handlers, customs, port authorities and health authorities," explains Camille Valero, project manager at Insemar (Higher Institute of Maritime Economics). "By being interconnected, these players gain in fluidity and traceability, and this helps reduce costs. For the State and its administrations, it is also the assurance of receiving revenue and avoiding smuggling," she adds.

The construction of a new "Port2000" terminal at the port of Le Havre to facilitate the evacuation of containers via the Seine (river access project study underway) will increase the quantity of goods handled at the port of Le Havre in TEUs by 2024.

It is important to note that the low capacity in terms of land of the MOCs is a notable brake to their development. From this point of view, the MOCs must also develop and deepen their relations with the municipalities and regions and not only with the central State. The objective is to find new land opportunities for port expansion, new logistics opportunities to facilitate container evacuation, and to include the local population.

According to the LFC Conseil 2020 ranking, the leading French port is in 79th place. It is the port of Le Havre with 2.35 million TEU, which with the COVID-19 and the social situation in France loses 15% of annual evolution compared to 2019.

However, the French state is aware of the considerable delay that the maritime sector holds. Today, the development of commercial ports remains at the heart of the reflections. Thus, the French state decided to react by initiating, in January 2021, the port revival plan in order to compete with the leaders of the sector.

### **c- THE PORT RECOVERY PLAN:**

The French government, through its Prime Minister, presented on January 22, 2021, its strategy for the development and acceleration of the competitiveness of French ports owned by the state in metropolitan France and the French overseas territories.

This strategy is accompanied by several announcements and objectives spread over the next 10 years. It is mainly focused on gaining market share in containers, investing in modal shift in pre- and post-carriage, digitizing processes in the entire ecosystem of the port hinterland, the ecological and digital transition ... etc.

It is also a question of leading the MOCs to be proactive players in the development and opening up of territories through innovation and the development of a global supply chain strategy in partnership with the public sector.

To this end, several actions have already been taken, such as the allocation of a budget of €175 million for the port recovery plan for the period 2021/2022. The ongoing deployment of a single transit window common to the MOCs called "France SESAME" to accelerate and facilitate customs operations. The merger of the platforms of the two French editors Soget and MGI to optimize the performance of the MOCs by creating "France PCS". The aim is to pool, automate and secure the flow of logistics data from the public and private port ecosystem.

The government's strategy is accompanied by the creation of an eco-label to promote green logistics chains, the publication of a research guide dedicated to maritime and port cybersecurity, the establishment of a monitoring committee to draw up an initial assessment by the end of 2021, and the setting up of an observatory of the performance of GPM.

## **II- DIGITAL INNOVATION AS A CATALYST FOR THE TRANSFORMATION OF FRENCH PORTS**

### **a. POTENTIAL INNOVATIONS**

Increasing the competitiveness of French commercial ports will logically be bound up with radical organizational changes. Indeed, this transformation will have some serious consequences, most notably from a human point of view. Nevertheless, by embracing this dynamic, the volumes (TEU) handled on a daily basis will increase as much as the resource savings.

The goal is to fully automate the port area, with technological innovation at the heart of the debate. At present in France, the time necessary to unload a container ship is too long compared to automated ports around the world, such as Rotterdam for example. In order to overcome this problem, it would be necessary to increase the existing means, such as gantries.

It is recalled that a gantry crane is a lifting device allowing the extraction of containers from the ship to the import dock.

By installing more gantry cranes in the port area, French ports will inevitably increase their handling capacity (in TEU), hence their productivity.

The port of Le Havre has taken this issue into consideration with the installation, in October 2020, of 4 new XXL gantry cranes to replace the first 10 "standard" cranes. The added value of these purchases is reflected by a gain in the time of handling, and consequently, of unloading of the container ship. Indeed, these installations allow doubling the grip of a "standard" gantry crane, going from one to two containers simultaneously.

However, in order to achieve maximum productivity, all handling operations must be replaced by "new innovative machines". The transfer of containers to the dock does not stop only with the placing on the ground. The aim would be to synchronize this transfer process with intelligent container robots that will ensure the routing of each individual TEU to a temporary storage area. The automatic guided vehicles will have a very good perception capability. This can be done by the means of sensors, ultrasonic and laser systems.

The management of their loading is particularly autonomous. Indeed, when it reaches a certain percentage, the robot will detect its own battery level and move towards the charging room. Then, the container, which will wait in the temporary storage area, will be quickly taken over by the motorized overhead cranes. These cranes allow the lifting and handling of heavy equipment. They have an integrated safety system to stop their operation when the maximum load is exceeded. These motorized cranes will completely modernize the current operation of the ports. Moreover, the massification of goods exchanges also brings with it a significant flow of information.

Indeed, throughout the supply chain, documents are exchanged between the various actors, such as the shipper's invoice or the customs declaration. The dematerialization of these documents remains essential, but not only.

The aim would be to have a shared communication interface for all port actors (shipper, consignee, customs, freight forwarder, road carrier). This would simplify and streamline the exchange of data or messages between the actors (e.g. customs operations).

Today the establishment of this type of common instrument remains " crucial " for all the ports throughout the world.

By implementing these innovative machines, and intelligent E.D.I systems the maritime sector in France will be more competitive with the increasing number of TEUs handled per day. Nevertheless, the implementation of these new automated technologies will necessarily require a significant enlargement of the existing port space.

From a financial point of view, considerable expenses are to be expected in the medium term, however, they will be recovered over the long term with the explosion of the volumes handled. In order to introduce this digitalization in all French commercial ports, it is recommended to start with a test environment and observe the results.

## **b. THEIR IMPLEMENTATION: TEST ENVIRONMENT AND DURATION**

*“I want France to become one of the great gates of continental Europe”* declared the Prime Minister in November 2017. To be competitive today and achieve a performance comparable to the port of Rotterdam or Hamburg (Germany), France must move to SMART PORT as he explained the director of Isemar Paul Tourret *“Optimization of port time management, administrative and regulatory simplification, tracking of goods: this is the major axis of port modernization in the world and France is in the race.”*

In order to automate a port, we need to connect all the stakeholders of the community through 4 phases; at first we must integrate the data and processes of different systems to ensure operational fluidity and coordination of different activities, which reassures the analysis of information and decision making. In the second phase, we need to automate the processes to facilitate the daily tasks and become more efficient by avoiding all the stops that are the consequence of errors and incidents that prevent manual work. Then we must put all the actors involved and computer system in network and with intelligent data sensors will act in a more agile way on the market which leads to a better service and therefore an added value thanks to this interaction and collaboration. And last but not least, it is necessary to put indicators in place which allows to control the efficiency of applications and operations by setting up a central dashboard and which allows to have precise and transparent information which facilitates long term planning.

*“The northern ports are now beginning to be saturated and from Asia, Marseille is four to five days less than going to Antwerp or Hamburg. We have all our cards to play”* states Stephane Reiche, the general delegate of the port of Marseille.

The port of Marseille plays a very important role today with its strategic location and with the arrival of the Silk Road which is rehabilitated by China, and which arrives to Lyon its automation has become a necessity which will allow to gain a big market share and to lighten the load which is put on the port of Le Havre which presents today 25% of maritime load in France. And as a consequence the port of Le Havre will be able to treat all the trucks that come from the French island instead of having to treat only 75% and the rest will be obliged to pass by the port of Hamburg or Antwerp what will act positively on the road traffic since we will avoid the waits and the traffic jams caused by the trucks as Carlos Moreno affirmed *“the development of the ports is not, as formerly turned towards the sea, or a river, but towards the conquest of the interior of the lands”*.

The automation of the port of Marseille is important at the beginning but also can present a suitable ground to test the new technology since it is a big port on the one hand but less risky in case of accidents or anomalies than the one of Le Havre which welcomes 500.000 containers per year.

In the second part and after automating the port of Marseille and re-establishing the positive results and other negative ones as the errors or the difficulty of the change management, we can put in place this intelligent technology in all the big port in France which will lead the French ports to develop, to gain in service rate, to optimize in activity, and to gain a part of the world maritime market which will make it competitive and at the beginning of the European and world rankings in a few years thanks to the strategic location of France and the road and railway infrastructure which connects it with the European countries.



### **c. THE CONSTRAINTS AND LIMITATIONS**

#### **Could dematerialization and digitalization threaten to lead to dehumanization?**

In maritime ports, it is the terminals that are affected by a wave of automation where human work is moving from machines to computerized monitors. The arrival of new technologies in the maritime industry is thus challenged by a world that is highly sensitive to security issues.

This concept demonstrates how a maritime-port future can be conceived wherein the human being is no longer directly in charge of the physical controls. He remains a process supervisor where the digitized non-material controls naval and port machines.

Naturally, many questions are being raised: from the simple technical feasibility, the accountability issue, to the societal acceptability (especially the automatic ship). Can dehumanization be limited? Dematerialization and digitalization can raise questions about this escape towards a world invaded by the digitalization of many tasks.

#### **Is this process well worth the effort and the expense? Is it the most suitable method to achieve a significant and sustainable profitability?**

Will the investment of capital (capex) be amortized by the cut in operational costs (opex)? The first risk of all this will perhaps be the over-investment. The challenge for many industries is "just cost", which raises the question of whether or not the investments are efficient.

A report published by the International Transport Forum on October 7 highlights the fact that the high cost of handling is not necessarily perceived as a major factor. If the automation of terminals proves to be interesting in terms of reducing the social costs of the terminal, the investment in automated equipment is more costly. "The reduction of labor costs through terminal automation is mostly dependent on each port," the report continues. The authors point out that it will mostly depend on the local social cost and the degree of automation implemented.

#### **How likely is the system to be compromised by cyber-attacks?**

Finally, the heart of our questioning here is the never-ending concern about system vulnerability. National, European, and American authorities are not lacking in warning about cyber security. The professional world is aware of the problem, as the Bimco report shows that Ships and shipping are vulnerable to cyber-attacks due to a lack of cyber security measures.

The cybersecurity field does not fail to recall the various attacks that any data exchange system can undergo, especially if it has an open system via the Internet. The danger can come from the simple desire to cause harm to the deliberate action (illicit traffic, or political motivation).

In the first instance, the automation will be carried out on closed systems, but the digital world is not lacking in vulnerabilities. The challenge will be all the more multiplied as digitalization concerns the movement of physical objects.

## CONCLUSION

Through this study, we were able to assess the dimension of maritime transport in the world. Today's challenges in terms of volumes at seaports require an optimization of logistics flows. Indeed, certain port have already started to expand and develop, such as Shanghai and Rotterdam. Nevertheless, French ports are lagging behind in terms of the number of containers they handle. For this reason, we have observed that there is already a port recovery plan to make French ports more competitive.

To this end, we wanted to demonstrate that innovations such as automation and robotization of certain logistics tasks are techniques that will allow French ports to be more efficient while reducing labor costs. Nevertheless, the dehumanization of the logistics tasks or the cyber-attacks, are brakes for some countries like France.

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