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Oil Transportation: ENI's fleet, Italian Ports and Pipelines (1950s-1970s)

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Abstract:

To make a profitable business, oil multinationalshave to include in their strategies the issue to transport crude from production sites to markets.EnteNazionaleIdrocarburi-Eni is the Italian state-owned oil company and a relevant oil player in the second half of the 20th century. This article focuses on Enito poin outthat oil businesses,to overcome trading limitations, invested in the creation of an oil transportation systemincluding naval fleets, ports and pipelines. Initially, the article displays the relationship between the oil market growth and the development of crude transportationsafter WWII until the early 1970s. Secondly, it analyses Eni's fleet, describingthe enlargement path of vesselsas well asthe increase in petroleum ships size, emphasising their limitations and constraints. Furthermore, it gives an international perspective. Finally, it analyses the development of ports and pipelines, i.e. the final tiles that complete the oil supply chain.

Introduction

In the 20th century,petroleumbecame a pivotal energy resource in developed nations, as well as a key component in the manufacturing of products and goods. Beyond the economic impact, the exploitation of oil and its derivatives affectedinnovations and technologies andit had repercussion on politics and on international relationships. No less important, it influenced societies and cultures, changing lifestyles and creating a 'petroleum culture'[i]. However, a critical feature of oil is that its possession varies from country to country and some of the main oil-consuming nations do not have this natural resource, or have very limited quantities of it. In particular, Western European nations are historically importers of it. Moreover, the areas where the accumulation of crude oil is greater are often far from the consumption centres[ii]. Therefore, to move oil from the natural sites to markets is inevitably a necessity for companies trading this raw material.

Oil industry has been studied in several respects, ranging from technical and technological features to political, geo-political, social and environmental aspects. Business history researches investigated on the history of some single companies but they have also focused their analysis on some particular features of oil firms, such as property and entrepreneurship, managerial capabilities, human capital, strategies and policies, especially linked to the exploitation and the use of oil and the production of fuel or petroleum derivatives[iii]. Oil companies have also caught the interest of multinational historians, who have studied, among others, some of the most important international majors[iv]. However, it seems that oil issues closely related to transportation have not been pursued further in the literature.

The 'Black Gold Rush' began in the early 20th century but it intensified after WWI, when Western Europe countries began to struggle to obtain some control over this resource of which they had not a significant production[v]. In this period, the 'Seven Sisters'[vi] already dominated the international oil market, but other oil-importing countries, namely Italy, France, Germany and Japan, made their moves to secure petroleum supplies. In these cases, the control over the resource was acquired often establishing state-owned enterprises, as in Italy with the AgenziaGeneraleItalianaPetroli-Agip, then EnteNazionaleIdrocarburi-Eni, and in France with the CompagnieFrançaise des Pétroles-CFP. Oil majors operated according to a vertical integration policy and 'each major was able to co-ordinate the flow of oil, under its own control, from its oil fields to its market'[vii], dictating a certain degree of oligopoly, if not even monopoly, in this market. Consequentially, the vertical-integration pattern was a strategy that those enterprises that wanted to enter the oil market yearn for.

For instance, ENI aimed 'to find its own sources of crude oil', therefore its policy was to offer to 'oil-producing countries more generous terms for new concessions than the majors were willing to do'[viii]. In terms of transportation, Eni owned its own fleet and it ensured its position in the management of ports and pipelines.

Objectives and sources.

The expansion of crude oil production and consumption began in the second half of the 19th century[ix]. By the early 20th, United States and Russia were the main oil producers and users. In the first decades of 20th century oil was discovered in other regions, namely South America and the Middle East, and 'these new discoveries were to alter radically the face of oil industry'[x] as they gradually became the most important areas for the supply of crude oil. This also meant that oil transportation movements increased. Petroleum companies, on the one hand, strengthened their naval fleet and, on the other hand, they laid pipelines to link oilfields to refineries. Ports also gained the interest of these companies because they were part of both the oil supply and distribution chain.

The present study focuses on these last issues. It aims to evaluate three main points, starting from the development of oil market. The second point is the analysis of the strategies and the governance on transportations of petroleum companies. In particular, our contribution analyses the development of oil naval transportations throughout the changes in companies' fleets. Finally, it investigates the role of ports and pipelines as connecting points between oil movements. The period of reference goes from the post WWII years up to 1970s and it corresponds to a time span in which the most developed countries adopted crude oil as one of their most important energy resources.

The article concentrates on a case study, that of Eni[xi], and compares it with the experiences of other oil companies, in particular with British Petroleum and Shell[xii]. Eni is the Italian leader in the national oil business and, in general, in energy resources in Italy. The company was built in 1953 and was a state-owned firm[xiii]. Eni was a holding and the management of the fleet, initially, relayed on Agip and after, in 1957, to Snam. The relationship with ports and the investment in ports were, instead, entrusted to two other subsidiaries: Irom and Stanic[xiv].

The Eni's Annual Report[xv] from 1954 to 1975 is the main source, but other documents preserved in Eni's Archives enriched the reconstruction of the development of Eni's fleet. The literature was used to fill in the analysis of the oil markets and to provide the international perspective.

1)The development of the world oil fleet (1953-1973) and ENI's position.

Already 'during 1880s ocean-going steam oil tankers began to challenge the dominance of sailing vessels in the sea transportation of petroleum'[xvi]. However, investments and developments in tankers were based on several factors related to the oil market and its forecasts[xvii]. In particular, the expansion of the oil fleet was estimated on expectations of an increase in consumption and in demand and on a pressure to raise production, especially after WWII.

Literature points out the main growth cycles in the history of oil industry based on the dominant use of oil. The first phase, 1860-1900, was defined as a 'lamp oil cycle'. After that, the era of the 'fuel cycle' began. From 1900 to 1940 there was an 'American cycle', because this country was the first starting to exploit oil as a fuel. The 'International cycle' took root from the 1940s and still continues[xviii], thanks to the intensification in the exploitation of low-cost oil resources in the Arabian/Persian Gulf area since the 1930s. In the period from the 1950s to the 1970s, the growth of the world oil production was strong and uninterrupted. The first stop to this trend was in the first years of the 1970s, when the oil market reached its maturity point. Therefore, in the 1980s oil production stagnated and this long phase of increasing production ended. The consumption side had a very similar path: it first expanded, then it reached its maturity point and finally it undertook a phase of stagnation. Oil consumption increased because of two factors. On the one hand, oil substituted coal as main energy resource and, on the other hand, after WWII transportations and processing costs reduced, allowing economies of scale for the exploitation of oil and its derivatives[xix].

Table 1.1 shows the expansion of oil market in the world in the period between 1953 and 1975, displaying the series of oil production, consumption and refining[xx]. These data confirm that oil exploitation grew during the last century and there was an increase both on the demand (consumption) and on the supply side (production and refining). Furthermore, the data underline that refining capacity developed a little faster than production and consumption.

After WWII, especially from the early 1950s, the energy demand raised and energy industries, as the Italian Eni, were aware of the fact that 'hydrocarbons will be called to participate in increasing proportion to the coverage of the world's energy needs'[xxi], also because there were 'fewer opportunities for expansion of other energy sources'[xxii]. At the middle of the 1950s, hydrocarbons supplied almost 45% of the energy produced (for consumption) in the world, when in 1905 they provided only 5%. In the next years, oil gained one of the leading positions among the primary energy resources[xxiii].

Table 1.1: World oil production, consumption and refining, 1953-1975 (million tons).

YEAR	PRODUCTION		CONSUMPTION		REFINING	
1953	657.060	(a)			710.8	(a)
1954	686.112	(a)			761.3	(a)
1955	769.919	(a)			790.5	(a)
1956	837.540	(a)			802.5	(a)
1957	880.800	(a)			848.6	(a)
1959	1000.000	(a)				
1960	1092.000	(b)			1214.0	(b)
1965	1566.800	(b)	1525.4	(b)		
1966	1633.000	(a)			1890.0	(a)
1967	1758.000	(a)	1770.0	(a)	2000.0	(a)
1968	2000.000	(a)				
1969	2133.000	(a)	2050.0	(a)		
1970	2358.000	(b)	2251.7	(b)	2567.0	(b)
1971	2455.000	(a)			2800.0	(a)
1973	2871.400	(b)	2767.5	(b)		
1974	2879.400	(b)	2727.4	(b)		
1975	2738.200	(b)	2696.7	(b)	3533.0	(b)

Sources: (a) = Ente Nazionale Idrocarburi, *Relazioni e Bilancio*, variousyears; (b) = http://www.unionepetrolifera.it.

According to the Annual Reports published by Eni, during the 1950s oil production grew at a leverage rate of 7% and, in 1959, it reached the share of 1 billion tons. After that, in only nine years it doubled this value, as oil production of 2 billion tons was gained in 1968. The consumption series also displays the development of oil use in the world, especially compared to solid fuels 'that in the last decade[, 1950s,] continually lost importance'. In particular, this trend represents the changes in transport that, as noted in the 1960 Eni's Annual Report, '[were] driven by the increase in road transport for which oil products are irreplaceable'[xxiv]. Concerning the refining, it is interesting to note that the refining capacities – at least in Europe – were already higher than oil consumption in the 1950s[xxv]. This condition, according to the data in the table, was maintained throughout the period considered. Besides, in these years, refineries became bigger in size and they moved closer to the consumption markets[xxvi]. Substantial changes in the world oil tanker fleet helped this transformation.

Ship transports were the 'most important'[xxvii] asset to move oil from the production and refining site[xxviii] to the consumption markets and table 1.2 gives an overview on the development of the world oil naval fleet from 1953 to 1973[xxix].

The fleet's growth was both in number of vessels and in ships' size. Indeed, new and bigger tankers replaced 'old' vessels that were dismantled. Consequently, the fleet's age decreased, gaining in quality, cost savings and, not last, in better conditions for crews. Finally, there was an increase in ships' constructions[xxx]. The table points out this feature, as the size of ships taken into consideration changes from 2,000 for the 1950s, to 5,000 in the 1960s and to 10,000 later.

Table 1.2: The development of the world oil fleet, 1953-1973 (million tons, dwt).

YEAR	WORLD TANKER FLEET	
1953	35,516	(a)(1)
1954	39,015	(a)(1)
1955	41,031	(a)(1)
1956	44,377	(a)(1)
1957	49,388	(a)(1)
1960	64,100	(b)(2)
1968	134,000	(a) --
1973	215,600	(b)(2)

Sources: (a) = Ente Nazionale Idrocarburi, *Relazioni e Bilancio* [Eni Annual Report], variousyears; (b) = http://www.unionepetrolifera.it.

Legend: (1) Ships of 2,000 millionand more tons of dwt; (2) = Ships of 5,000 million and more tons of dwt (1960); ships of 10,000 millionand more tons of dwt (1961-1975).

The 1955 Eni Annual Report emphasised that 'a clear tendency has been established to build oil tankers of ever-increasing tonnage and speed'. Moreover between 1918 and 1955, 'the size of the world oil fleet increased at an average annual rate of 7.2% compared to a 6.7% rate for oil production'[xxxi]. In general, the tankers' expansion in number was related to the growth in oil production and consumption, but the dimensional change relayed more on others factors. After WWII, several key events affected the oil industry, from the rising of oil nationalisms by oil-owning countries to the discovery of oil in other countries (i.e. Nigeria). However, the event that affected more the oil industry was the fall of the 'cardinal principles underlying' oil fleets. These principles were put in place already in the 1890s and dictated that 'the optimum size of a tanker was something that could pass through Suez'[xxxii]. Therefore, the Suez Crisis in 1956 changed the old patterns and speeded up the building of larger tankers. The closure of the canal led to the extension of oil routes, requiring new ships more suitable for long-distance navigation and, above all, vessels that could provide economies of scale loading larger amount of crude.

Table 1.3: World oil fleet by geographic area, benchmark years (million tons, dwt)

	31-12-1955 (a) (1)	31-12-1957 (a) (1)	31-12-1960 (b) (2)	31-12-1973 (b) (2)
Liberia	4,105	8,406	11,1	59,2
Panama	3,169	3,392	3,5	7,6
Greece			1,8	12,6
Norway	6,295	7,317	9,4	21,2
Japan		1,308	2,2	26,1
United States	8,13	7,87	8,9	9,5
France	1,882	2,19	3	9,6
United Kingdom	7,479	8,363	9,8	27,8
Italy	1,77	2,053	2,5	5,5
ex URSS			1,1	4,4
OtherFlags	8,201	9,923	10,8	32,1
Total	41,031	50,822	64,1	215,6

Sources: (a) = Ente Nazionale Idrocarburi, *Relazioni e Bilancio* [Eni Annual Report], variousyears; (b) = http://www.unionepetrolifera.it.

Legend: (1) Ships of 2,000 million and more tons of dwt; (2) = Ships of 5,000 million and more tons of dwt.

Finally, the main reason behind the vesseldimensional growth was the need to reduce unit transport costs. A new era began, characterised by a rapid increase in ships' tonnage. During the 1950s, 'super tankers' – more than 28,000-ton tankers – were created and, in the middle of the 1960s, a 'new still-larger class' of tankers was built.

The 'Very Large Crude Carrier (VLCC)' were vessels with a capacity of 200,000 deadweight tons or more[xxxiii]. Data in table 1.2 display this spurt, even if the range of the fleet's tonnage considered there varies between 1960 and 1973.

Table 1.3 gives an overview of the subdivision by geographical area of the world fleet and it's interesting to note that there were some variations in the long term. In particular, data demonstrate that the relevance of the 'convenience flag' of Liberia took more power during this period, while that of Panama decreased. However, as the United States owned – with Greece – the biggest part of these two flags, it's likely that this country possessed in its hand most of the world oil tankers, even if the direct ownership declined over time. The United Kingdom was the second nation to have a substantial share of the market, but as for the United States it lost value in this period. Also, the Norwegian and the Italian data show a progressive reduction in their share of ownership, above all in 1973. On the contrary Japan and Greece were the ones that gained more relevance in this year. In any case, focusing on the relative position of Italy, and therefore on that of Eni, it is clear that Italy wasn't in a dominant position in this field. Indeed, in 1955 the Italian fleet represented 4.31 per cent of the world tankers and then, in 1973, only 2.55 per cent.

2)Eni's fleet.

At the end of the Second World War, Agip's fleet was in large part sank, severely damaged or commandeered by nations which had fought against Italian-German alliance. Only at the conclusion of the war it was possible to recover and restore the motor tankers Rapallo and Sergio Laghi for the supply of foreign crude oil, as well as the smaller units Ugo Fiorelli and VittorinoZanibon, mainly intended to coastal shipping between Italian ports. After the appropriate repairs, four other minor ships, still immobilized in the Italian ports, were furthermore completed or equipped: they were named Pianeta, Cometa, Nebulosa and Satellite, the latter sold in 1949. Another vessel, the former Standard I flying Italian flag, then Tevere flying German flag, was purchased by Agip in 1943 and then resold in 1948. During this first post-war phase, Agip's tankers were steadily used to supply foreign crude oil to the Irom refinery in Venice-Porto Marghera, owned by a joint venture between Agip and Anglo-Iranian Oil Company, for the transportation of fuel oil to national ports, as well as chartered for third-party oil transport[xxxiv].

Once the post-war emergency situation was overcome, by the end of the '40s some early projects for the renewal and the expansion of the fleet were finally discussed, but they would have seen the light of day only in the early '50s. Indeed, in 1950 Agip's fleet still consisted of seven units, with a total of about 32,000 dead weight tons (dwt); it appeared on the company's balance sheet with a value of little more than 2 billion Italian lire[xxxv]. In 1951, to quickly respond to the ongoing increase in imports of foreign crude oil, especially from Middle East and Venezuela, Norwegian motor tanker Norfold (built in 1930, 10,500 dwt) was finally purchased and then renamed Canopo (cf. table 2.1).

In the early '50s, rapid and unpredictable freight market fluctuations and more favourable conditions of disposal facilitated in Italy the scrapping of older vessels, replaced by more efficient and larger units. The beginning of the new phase coincided, also for Agip, with the relaunch of a modern corporate tanker fleet: it was necessary to face increased needs of transportation and distribution due to the expected growth in the demand for crude oil and oil products[xxxvi]. At the same time the company's management decided to enhance domestic and maritime connection systems, by the strengthening of the coastal deposits and of the connected distribution networks, especially pipelines. Finally, a second type of intervention concerned the increase in the processing capacity of the Irom refinery in Venice[xxxvii].

Hence, starting from 1952, a programme regarding the construction of four 19,000 dwt motor tankers was gradually carried out and the new ships were put into service in the three following years with the names of Cassiopea, Andromeda, Alderamine and Cortemaggiore (cf. table 2.2). Their launch allowed Agip's fleet first to exceed and finally to double its pre-war total tonnage. In the meantime, within the process of reorganization of corporate activities following Eni's foundation, in 1953 Agip assumed the role of Group's commercial company and it was again entrusted with the management of the tanker fleet, at that time consisting of ten units for a total of about 81,000 dwt, in addition to two more tankers (Alderamine and Cortemaggiore, 38,000 dwt in all) under construction. According to corporate sources, on the basis of such figures Agip owned about 7.5 per cent of the national tanker fleet (equal to 1,586,272 dwt), which was in turn equal to 4.4 per cent of the world fleet. At the end of the same year, the fleet appeared on the company's balance sheet with a value of 11.6 billion Italian lire, 10.7 per cent of the company's asset[xxxviii].

Table 2.1: Agip. Tanker fleet in operation in 1951

Name	**Year of construction**	**Shipyard of construction**	**Dwt**	**Period of service under Agip/Eni's flag**
Rapallo (steamer-tanker)	1921	Genoa-Riva Trigoso	8,500	1926-1941 1947-1955
Sergio Laghi (motor tanker)	1942	Trieste-Monfalcone	14,588	1942-1943 1943 (chartered until 1947)-1970
Ugo Fiorelli (motor tanker)	1943	Trieste-Monfalcone	2,150	1943- mid-'60s
VittorinoZanibon (motor tanker)	1943	Trieste-Monfalcone	2,150	1943 1947-1965
Pianeta (motor tanker)	1943-1948	Trieste-Monfalcone – Ancona	2,705	1948-1965
Cometa (motor tanker)	1944-1946	Venice-Porto Marghera	1,140	1946-1974
Nebulosa (motor tanker)	1945-1947	Venice-Porto Marghera	664	1947-1956
Canopo (motor tanker)	1930	Glasgow	10,500	1951-1964

Sources:Di Nitto, *Uomini e navi,* cit., pp. 26 and 51-79; Eni, *Relazioni e bilancio*, variousyears; Agip, *Relazioni e bilancio*, variousyears.

Around the mid-50s, the world oil shipping system was characterized by an increase in tankers tonnage, speed and efficiency, in order to reduce unit operating costs. Larger tankers still couldn't dock at all ports, though, whereas others, due to their sizes, couldn't pass through the Suez Canal, which by now was the centre of the world oil traffic. On the other hand, the eight major oil companies managed, vessels under flag of convenience included, more than 50 per cent of the world tanker fleet. Nevertheless, the overall data showed a shortage of tankers, due to the strong increase in oil transportation demand, in turn caused by the continuous growth in crude oil demand[xxxix]. Therefore, several companies - as for example British Petroleum and Shell - planned new constructions, also to face the rapid fluctuations characterizing the freight market in this phase[xl].

At the end of 1955, Agip's fleet consisted of eleven units for a total of about 110,000 dwt and its value rose to 16.35 billion Italian lire, 14.5 per cent of Agip's asset[xli]. In the same year, corporate tankers transported 1.74 million tons of crude oil and oil products, respectively 21.67 per cent higher than in 1954 (1.43 million tons) and 74 per cent higher than in 1953 (1 million tons)[xlii]. Indeed, the entry into operation of the tankers Alderamine (1954) and Cortemaggiore (1955) determined a substantial increase in the fleet's transport capacity, which in 1955 was, in terms of tonne-nautical miles, 79 per cent higher than the previous year[xliii].

The following year, 1956, was, as is known, dominated by the Suez crisis, or the Second Arab-Israeli War, which deeply affected oil shipping. From the perspective here considered, the main effect of the crisis was the general shift of oil traffics, since European economies were forced to satisfy their growing energy needs by the circumnavigation of the African continent. The emergency situation reinforced the underway trend of building larger and faster ships, also by reason of uncertainties and fears regarding the possible lengthening of routes due to the prolonged closure of the canal or to the delayed adaptation of its transit capacity. Also, the heavy consequences of the crisis on maritime freight rates strengthened this tendency[xliv].

Table 2.2: Agip. Ships put into service from 1952 to 1955

Name	**Delivery year**	**Shipyard of construction**	**Dwt**	**Period of service under Agip/Eni's flag**
Cassiopea (motor tanker)	1952	Ancona	19,300	1952-1968
Andromeda (motor tanker)	1953	Trieste-Monfalcone	18,880	1953-1968
Alderamine (motor tanker)	1954	Trieste-Monfalcone	19,000	1954-mid '70s
Cortemaggiore	1955	Castellammare di Stabia	19,000	1954-1984

(motor tanker)				

Sources: Di Nitto, *Uomini e navi*, cit., pp. 83-90; Eni, *Relazioni e bilancio*, variousyears; Agip, *Relazioni e bilancio*, variousyears.

As a result of these causes and of the expected further growth in domestic oil consumption, the Italian holding's top management decided to put into action a new tanker fleet enlargement programme, planning a significant increase in total dead weight tonnage through the launch of two new units of more than 70,000 overall dwt. At the end of 1956, thanks to the investments of previous years, Agip's tanker fleet appeared on the company's balance sheet with a value of little more than 18 billion Italian lire, about 11 per cent of the company's asset[xlv].

In 1957, within the corporate restructuring plan into homogeneous economic branches, the actual management of the tanker fleet was transferred from Agip to another Eni's subsidiary, Snam, the Group's operative company entrusted with the transport branch[xlvi]. At that time the Italian oil holding's fleet included ten tankers, for a total of about 110,000 dwt, in addition to two more smaller units (366 net weight tons in all) used for liquefied gas transportation. The fleet's overall asset value amounted to about 21.8 billion Italian lire, equal to 11.7 per cent of Agip's asset. In the same year, Eni's tankers transported 2.2 million tons of crude oil and oil products, with an increase of 37.6 per cent compared to the previous year[xlvii].

Following the Suez crisis, in 1957 the tanker Alcantara (8,770 dwt) was finally purchased (it had been chartered by Snam in previous years) to ensure cabotage transport of local crude oil intended for refining plants managed by Eni's Egyptian partners in the Suez area; nevertheless, it was soon decommissioned in 1959 and demolished in 1960. In the meantime, in 1958 and 1959 respectively, the two 72,000 overall dwt tankers designed in the previous years were put into service, under the name of Agip Ravenna and Agip Gela, thus increasing the fleet's total tonnage of more than 60 per cent by the end of the decade (cf. table 2.3).

Table 2.3: Agip/Snam. Ships put into service from 1957 to 1959

Name	**Delivery year**	**Shipyard of construction**	**Dwt**	**Period of service under Snam/Eni's flag**
Alcantara (motor tanker)	1957 (purchase)	Malmö	8,770	1957-1960
Agip Ravenna (turbine tanker)	1958	Ancona	36,182	1958-1967
Agip Gela (turbine tanker)	1959	Ancona	36,182	1959-1968

Sources: Di Nitto, *Uomini e navi*, cit., pp. 77, 91 and 95; Eni, *Relazioni e bilancio*, variousyears.

Indeed, in 1960 the fleet owned by Snam consisted of fourteen ships, with a total of about 182,000 dwt[xlviii].To quote some figures regarding the extent of its activity, in the same year the Group's tanker fleet transported 3.480 million tons of crude oil and oil products, whereas 9,373 tons of liquefied gas were transported by corporate gas carriers. Transport operations carried out by chartered tankers on behalf of Group's subsidiaries amounted, instead, to 2.268 million tons of crude oil and oil products, in addition to 26,541 tons of liquefied gas. At the beginning of the '60s, the shares of raw material transported by sea by Eni-owned ships were therefore equal to 60.5 per cent of crude oil and 26 per cent of liquefied gas. With respect to the routes sailed by both corporate and chartered tankers, about 60 per cent of crude oil moved by sea on behalf of the Italian holding concerned crude imports from Middle East and Black Sea to Italian ports[xlix].

The technological turn, which also involved Eni's maritime transport branch, took place during the '60s: in accordance with the most recent construction techniques, new tankers were characterized by the shift of crew quarters and bridge deck from the centre to stern of the vessel, the reduction of the surface areas exposed to the wind, the improvement of radar instrumentation and safety devices, the adoption of faster and more efficient loading and unloading systems, whereas the tonnage per unit reached 80,000 dwt by the end of the decade[l].

Table 2.4: Snam. Ships put into service from 1961 to 1964

Name	**Delivery year**	**Shipyard of construction**	**Dwt**	**Period of service under Snam/Eni's flag**
Agip Bari	1961	Trieste-Monfalcone	48,830	1961-1982

(turbine tanker)				
Agip Livorno (turbine tanker)	1961	Trieste-Monfalcone	48,830	1961-1983
AgipVenezia (turbine tanker)	1961	Trieste-Monfalcone	48,900	1961-1983
Agip Ancona (motor tanker)	1963	Ancona	50,900	1963-1984
Agip Genova (motor tanker)	1963	Ancona	50,900	1963-1983
Agip Trieste (motor tanker)	1964	Trieste-Monfalcone	49,300	1964-1984

Sources: Di Nitto, *Uomini e navi*, cit., pp. 99-117; Eni, *Relazioni e bilancio*,variousyears.

In the meantime, the international projection of its business strategy had led Eni to strengthen its presence in African and Middle Eastern crude supply markets, in open competition with the world oil cartel companies[li]. Such competition, in turn, extended from the mining segment to the following stages of the production and distribution process, pushing the Italian holding to pursuit a higher degree of vertical integration of its activities, in order to enhance the Group's autonomy in the global market[lii]. This tendency has to be seen precisely in light of the world oil market conditions, characterised by a situation of increasing overproduction, due to the important oil deposits discoveries that have occurred since the '50s in Africa and Middle East[liii]. In Italy's case, the availability of cheap crude oil was furthermore increased by the signature of the 1960 supply agreement with URSS, which covered 14.8 per cent of Italy's total oil imports at the beginning of the '60s[liv]. All these factors determined the inclusion of the strategies of development of the oil transportation systems – both by sea and by land – towards the Italian and European areas of industrial consumption between the pressing issues of the national energy security[lv].

The situation also influenced the evolution of Eni's corporate shipping branch, whose renewal took shape thanks to the fleet development programme started in 1960, with the launch and fitting-out of the 48,000 dwt Agip Bari and Agip Livorno, built by Fincantieri in Trieste-Monfalcone and delivered to Snam in 1961, followed by a third 48,000 dwt tanker, AgipVenezia, launched and delivered to Snam in 1961, again by Fincantieri. With the entry into service of the latter, total Eni's fleet tonnage rose to about 330,000 dwt. In 1963 the twin tankers Agip Ancona and Agip Genova (50,900 dwt each), built in Ancona's shipyard, entered into service. In the following year, with the delivery to Snam of the tanker Agip Trieste (49,300 dwt), equipped with a nearly 19,000 cv engine and with the latest in state-of-the-art shipping technology, the fleet expansion plan launched in the early '60s was fulfilled (cf. table 2.4)[lvi]. Considering the disposal regarding less recent and efficient units, in April 1964 the Group's fleet consisted of sixteen tankers, reaching a total of about 480,000 dwt, in addition to two gas carriers of 1,100 net weight tons in all. Focusing on the growth in Eni's fleet transport capacity, the amount of crude oil and oil products transported by tankers owned by Snam increased from 4.17 million tons in 1961 to 6.8 million tons in 1964 (+63 per cent); in the same time frame, the liquefied gas transported via sea rose from 13,251 tons to 52,707 tons (+297.7 per cent)[lvii].

In 1964, Group's investments allocated for fleet enhancement amounted to about 2 billion Italian lire, equal to 1.22 per cent of the holding's overall investments[lviii]. The following year, Eni's top management decided to put into action a plan of liquefied gas import by sea, with the aim of coping in time with the expected shortage due to the progressive depletion of domestic natural gas deposits, intensively exploited for years. For this purpose, since the construction of a coastal terminal for unloading, storage and regasification operations was necessary, its realisation and management responsibility were entrusted to Snam. The location chosen as the most suitable for this goal was the inlet of Panigaglia, in La Spezia Gulf, considered particularly fitting by reason of its natural (seabed, exposure to winds) and logistic (dock, interconnection with the existing pipelines network) features[lix]. This decision followed the agreement signed at the end of 1964 in New York with Esso International Co. and Mediterranean Standard Oil Co., concerning the provision of up to 3 billion cubic metres of Libyan gas per year, with delivery starting from the early months of 1969[lx]. The choice to import natural gas from North Africa was, in turn, tied to the pursuit of a national policy aimed at reducing energy supply costs, both decreasing the risks of the country's dependence on foreign oil and diversifying in the meanwhile the energy supply markets[lxi].

In 1965, tankers owned and managed by Snam transported about 7.3 million tons of oil products, 49.5 per cent of the 14.8 million overall tons transhipped by sea, in such year, to satisfy Group's needs. Foreseeing a further increase in national energy consumption and, hence, in foreign oil demand, with the launch of the five-year corporate development programme for the years 1966-70 Eni's top management established a multiannual allocation of 59 billion Italian lire in order to finance a new fleet strengthening plan, with the aim of covering by owned ships at least 70 per cent of the holding's maritime transportation needs by the beginning of the '70s. As will be seen, this percentage was nevertheless revised downwards in the following years[lxii].

Two years later, the 1967 Suez Canal closure, caused by the Third Arab-Israeli War and continued up until 1975, represented a great impact event for the maritime transportation industry, especially for the oil one. The necessity of circumnavigating Africa to reach the Middle Eastern area, at the time the main crude oil provision market, stimulated oil companies to commission the construction of larger size vessels, so as to amortise the strong increase in transport costs due to the substantial lengthening of sea routes in comparison to previous years. Eni's source diversification policy only partly mitigated the negative impact of Suez crisis on the amount of crude oil and oil products transported by sea[lxiii]. To quote just one significant information, in 1968 the average duration of travels carried out by Snam's tankers suffered an estimated increase of 30 per cent, with unavoidable consequences also on the overall traffic volume. Indeed, whereas in 1967 corporate fleet transported 6.4 million tons of crude oil and oil products (third-party transport not included), with a decrease of 8.6 per cent if compared with 1966 (7 million tons)[lxiv], in 1968, also by reason of the ongoing fleet renewal plan, this amount further diminished by 40 per cent, dropping to 3.8 million tons[lxv].

New world market conditions and constraints imposed by international competition pushed Eni, therefore, to achieve increasing economies of scale also in the maritime transport branch. Hence, with the aim to make Snam's tankers average size more adequate to the technological evolution of the sector, among 1967 and 1968 Eni's top management decided the sale of the tankers Agip Ravenna and Agip Gela, followed by the smaller and older units Andromeda and Cassiopea, equal to 110,000 dwt in all. Meanwhile, the corporate fleet modernisation plan went on (7.6 billion Italian lire were allocated in the two-year period 1967-1968)[lxvi], put into practice thanks to the construction of two modern vessels of 85,000 dwt each, named Agip Milano and Agip Roma (cf. table 2.5). Built in Palermo's shipyard, these latter entered into service in 1968 and 1969 respectively and were intended to be used along Persian Gulf routes, via the circumnavigation of the African continent.

Table 2.5: Snam. Ships put into service from 1968 to 1969

Name	**Delivery year**	**Shipyard of construction**	**Dwt**	**Period of service under Snam/Eni's flag**
Agip Milano (motor tanker)	1968	Palermo	85,000	1968-1987
Agip Roma (motor tanker)	1969	Palermo	85,000	1969-1992

Sources: Di Nitto, *Uomini e navi,* cit., pp. 124 and 127; Eni, *Relazioni e bilancio,*variousyears.

In general terms, the increase in maritime freight rates which followed the Egyptian crisis was meanwhile partly absorbed during 1968, although stabilising at a level higher than the particularly depressed quotations which had characterised the pre-crisis phase. The expected growing demand for oil and natural gas and the change occurred in traditional sea routes prompted, consequently, the Group's management to enhance the investment plans of its subsidiaries operating in the maritime (fleet) and overland (pipelines) transport sector. In particular, according to Eni's renewed investment programme in tangible assets for the years 1969-1973, the tanker fleet would have benefited from an allocation of 25 billion Italian lire, 1.2 per cent of Group's overall planned investments regarding the same period. The declared objective was to have a corporate fleet able to cover by its own means a share of not less than 50 per cent of Group's needs, so as to achieve a suitable balance between economic, logistical and shipping necessities. Furthermore, this would have enabled the Italian holding to face in an economically more efficient manner the extension of oil research activities to further geographical areas, by exploiting the economies of scale achieved by using larger transport units. At the same time, the company promoted the expansion of pipeline networks departing from national ports interested by the governmental programme of infrastructural development, aimed at the realisation of some large port sites, able to allow the docking of the new super tankers[lxvii]. The completion works of Panigaglia's port infrastructures fitted into this context, which became operational in the spring of 1969.

In the same year, thanks to the entry into operation of the new 85,000 dwt tankers Agip Milano and Agip Roma, Eni's fleet – at the time consisting of 11 units, for a total of about 540,000 dwt – was able to transport 6.9 million tons of crude oil and oil products, as in the pre-crisis period (cf. tables 2.6 and 2.7)[lxviii]. In 1970, however, holding's own vessels could cover only 28 per cent of the amounts transported on behalf of the Group as a whole during the year[lxix].

Table 2.6: Eni's fleet. Total dead weight tonnage 1950-1970

Year	**Dwt**
1950	32,000
1951	42,400
1952	61,700
1953	80,600
1954	100,000
1955	109,930
1956	118,000
1957	118,000
1958	145,000
1959	190,000
1960	182,746
1961	225,000
1962	325,206
1963	478,264
1964	467,764
1965	462,910
1966	462,910
1967	389,902
1968	453,895
1969	538,980
1970	524,389

Sources: Agip, *Relazioni e bilancio*, variousyears; Eni, *Relazioni e bilancio al 31 dicembre 1967*, cit., pp. 8-9; Eni, *Relazioni e bilancio al 31 dicembre 1970*, cit., pp. 8-9.

Table 2.7: Eni's fleet. Amount of transported crude oil and oil products 1953-1970

Year	**Million tons**
1953	1.00
1954	1.43
1955	1.74
1956	1.60
1957	2.20
1958	--
1959	2.93
1960	3.48
1961	4.17
1962	5.24
1963	5.60
1964	6.80
1965	7.30
1966	7.00
1967	6.40
1968	3.80
1969	6.90
1970	7.90

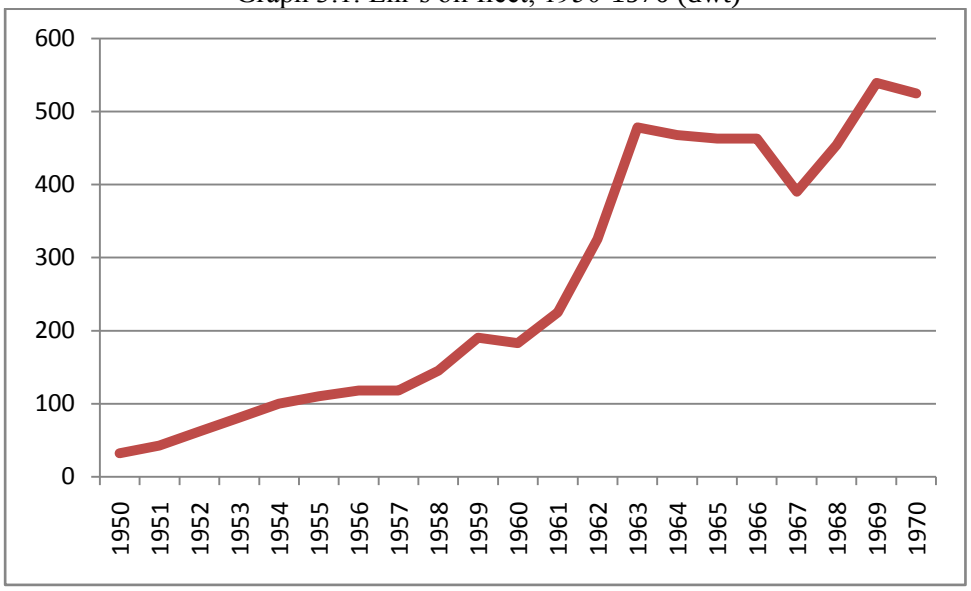
Sources: Eni, *Relazioni e bilancio*, cit., *1953-1970*.

Following the described evolution, Eni's tanker fleet faced the great maritime revolution of the '70s, which marked the definitive affirmation of the super tanker era. During this decade, the general framework of the oil maritime transport sector was indeed changed not only by the prolonged closure of the Suez Canal, but also by some events able to bring public awareness on environmental issues, leading to the enactment of new international laws aimed at improving the safety of the oil sea transport system, which accentuated the epoch-making character of the ongoing change[lxx].

3)An international perspective.

Graph 3.1 resumes the development of Eni's fleet from 1950 to 1970. During these twenty years, the Company's fleet grew, showing a path similar to that of the world oil fleet (table 1.2). In particular, both trends display a spurt in the early years of the 1960s. However, in Eni case, after this fast development there was only a little increase until 1970, with a decreasing year in 1967. Conversely, in the period between 1963 and 1970 the world's fleet raised two times and a half.

Graph 3.1: Eni's oil fleet, 1950-1970 (dwt)



Sources: data from Table 2.6.

First of all, it's important to remind that Italian tankers were a small percentage of world oil vessels. Italian flags were 4.31 per cent of world tankers in 1955, 4.04 per cent in 1957, 3.9 per cent in 1960 and 2.55 per cent in 1973 (table n. 1.3). Therefore, the best terms of comparison of Eni's fleet to others is throughout the analysis of the vessel's development in size, even if some insights in the numbers could arise interesting remarks.

In the first half of the 20th century, the oil tankers size was strictly related – as already pointed out – to that of the Suez Canal. Indeed, this was the most profitable route 'to carry oil or anything else […] to and fro between Europe and the Far East'[lxxi]. From its opening and 1954, the canal was enlarged and the limit deadweight admitted through the Canal increased from about 7,000 dwt to 32,000 dwt in 1954. Therefore, until mid-1950s oil vessels size grew slowly, even if ships innovations and technologies could already provide bigger vessels. *Murex* was the first Shell oil tanker and in 1892, with its 5,010 dwt, it was an average-sixe vessel for the time. In the first decade of the 20th century, oil ships of around 7,000 dwt were delivered and, around the 1920s, the 10,000 tonners were the standard. In the next decade the size increased a little to 12,000 tons. This last tonnage was also the most used to rebuild the companies' fleets in the recovering years after WWII. Shell 'H-class' vessels of 18,000 dwt was the 'company's backbone' until the mid-1970s[lxxii].

However, the necessity of economies of scale, arisen in the 1950s, led to 'phenomenal increases in tankersize' and 'the third quarter of the 20th century' was an era 'without precedent in shipping history'[lxxiii]. In this period vessels became super tankers and after VLLCs, reaching a size of more than 200,000 tons.

Eni's fleet – Agip's until 1953 – likewise the world fleet, grew in the second half of the 20th century, both in numbers and in size[lxxiv], following only partially the general trend. Before the 1950s, the size of Eni's ships corresponded to what was considered the standard for the period. Indeed, among its tankers there were ships with a size between 664 to 15,000 dwt.

In the 1950s, the Company started the process of 'size-enlargement' and in this decade several ships of almost 20,000 tons were acquired, as well as two units of more than 36,000 tons. In the 1960s, there was another spurt in growth, but it's interesting to note that the maximum size achieved by Eni's vessels was 85,000 tons, so quite far from that of the VLLCs. In terms of units, Eni's fleet owned 11 vessels both in 1955 and in 1969. However, as seen in the previous paragraph, in the 1960s there was an increase in the ships possessed by Eni. In 1960, the Company had 14 units and in 1964 they reached 16 units. This data, compared with the development in terms of size, emphasizes the growing strategy undertook by Eni: in size rather than in number. Indeed, in 1967 and in 1968 were sold some ships – among these Agip Ravenna and Agip Gela of little more than 36,000 dwt – and in the next years they were replaced by the two larger vessels owned by Eni during this period, Agip Milano and Agip Roma, of 85,000 dwt each.

BP dominant strategy was that of building up 'an absolutely self-contained organisation', with its own distributing organisation – the British Petroleum Company Limited – that had to be 'supplied through its own tanker organisation, the British Tanker Company'[lxxv]. The British Tanker Company Ltd was founded on 3rd April 1915 and at the time of its foundation it already had some ships, but already in 1915 were put orders to increase the fleet. The BP's fleet' development followed the growth in the oil market, and at the end of WWI already amounted to 30 tankers[lxxvi]. During the first half of the century, BP expanded its fleet, both in numbers and in size, throughout several enlargement programs[lxxvii]. As a result, in 1951 BP owned 152 tankers with a total of 1,850,000 dwt.

Shell fleet was created in 1892 with the launch of *Murex*, but already in 1894 Shell launched nine more ships. These ships were all named after shells and they had similar features: four of them were 5,010 dwt tons and six of them were 5,500 dwt tons[lxxviii]. In 1907, Shell amalgamated with Royal Dutch and transportation and storage went under the newly Anglo-Saxon Petroleum[lxxix]. Therefore, the ships of each company became Anglo-Saxon tankers. The fleet grew gradually and, to rebuild its numbers after WWI losses, the company undertook a 'programme of replacement and expansion' buying existing ships rather than wait for new buildings. This strategy assured a faster recovery and, in 1920, Shell fleet reached 103 ships[lxxx].

In the firsts two decades of the 20th century, BP and Shell fleets consisted essentially of tankers from 5,000 to 10,000 dwt. In particular, for both companies 10,000 tonners became the standard ship during the 1920s. In the next decade the size increased to 12,000 tons and BP considered it the most useful. This vessels were 'general purpose ships', so they were versatile and they could be employed 'to haul crude oil from the Middle East via the Suez Canal to the Company's European refineries or, more commonly, to ship refined products from Abadan [the main refinery of the time] to Western Europe, always through the Suez Canal'[lxxxi]. BP's tanker dimension stayed stable until after WWII and it was also the model used to rebuild the fleet after war losses[lxxxii]. Shell fleet in 1939, at the eve of WWII, 'had increased by more than 1.3 million deadweight tons, and […] formed about 10% of the whole world's tanker tonnage[lxxxiii]. The fleet lost nearly 40 per cent of its size in war destructions but in 1946 'almost all its losses had been replaced. [Furthermore,] in the four year immediately after the war (1946-1949 inclusive) Anglo-Saxon acquired a total of just over 700,000 dwt of new shipping'[lxxxiv]. They were 71 ships and once again small – about 9,000 tons dwt – but they contributed to enlarge the already wide Shell fleet.

In the late 1940s there were several changes in the oil supply chain. BP's strategies moved to prefer market-located refineries rather than the largest one of Abadan. For that, the Company needed to enlarge its ship size and it started to place orders for tankers of 28,000 tons. The era of the 'super tankers' began and otheroil companies, for example Shell, undertook this path in the early 1950s[lxxxv]. Furthermore, the super tankers, opposite to the general ships of 12.000 tons, were specialised crude carriers and with them companies opened at the idea of increasing even more the vessel's size. Therefore, in the early 1950s, orders of 32,000 tons ships began and they continued with other new orders in the middle of the decade.

The Suez Canal crisis had several consequences on, in general, world oil fleets[lxxxvi]. For BP, on the one hand, caused the dismantling of part of the fleet, mainly the pre-war ships of 12,000 tons. On the other hand, there was a new increase in the size of crude carriers and new super tankers came into service: BP's first 50,000 tonner, the *British Queen*, was delivered in 1959[lxxxvii]. Shell also chose the 'option' to 'encourage the building of bigger oil-carrying ships' and started to launch larger ships[lxxxviii].

In the middle of the 1960s, BP and Shell introduced their first tonners with capacity over 100,000 tons. A second Suez Canal closure (mid-1967) newly led to a tonnage increase and Very Large Crude Carriers (VLCCs) were introduced in the oil fleets.

These vessels had higher scale economies and made longer voyages to deliver oil, especially the one around Africa, cheaper than the usual voyage undertook by super tankers throughout the Suez Canal. Finally, at the beginning of the 1970s BP continued to invest in these size vessels and ordered several new VLLCs.

In 1950, BP owned about 150 vessels, but at the middle of the 1970s they drop at about 100 units, after reaching a maximum of 170 ships in 1957. In the period taken into consideration, the development in number of BP's fleet displayed a downward trend[lxxxix]. The increasing phase, as already pointed out, ended in 1957. In this period, there was only a negative year in 1953. The long falling phase began in 1958 and it lasted until 1975. However, in general, as discussed in the analysis of ship sizes, the decrease in number was more than offset by the increase in size. In the last years of the 1950s until 1961, BP's fleet lost about 30 units. After that, during the 1960s, the fleet maintained a certain stability, around 130 units. A second drop took place between 1971 and 1973, when the number reduced to just over 100 units. In 1974, there was a spurt to almost 120 ships, but the following year ships went back to 100. In terms of dwt, BP's fleet moved from less than 2 million dwt in 1950 to around 8 million dwt in 1975[xc]. The development in size continued. As said, in 1951 specialised crude carriers – 28,000 to 200,000 dwt – were introduced and their importance compared to general purpose carriers increased until 1969, when VLCCs gradually took the first place. In 1975, about 62 per cent of BP's fleet total dwt was carried by VLCCs, 25 per cent by crude carriers and the remaining by general purpose tankers.

These analyses on the development of Eni and the other two flags fleet stress several points. First of all, and as already pointed out, Eni's fleet was smaller than BP and Shell's, both in number and in size. In particular, in number it was about a tenth of the BP's and smaller in size. Nevertheless especially regarding with BP case, they displayed a similar growing path: a first phase, started around 1950, in which the number of vessels increased and a second phase, ended by the middle of the 1970s, in which there was a decrease to the initial level. It is interesting to note that BP's fleet reached the maximum expansion in number in 1957, seven years before Eni. Moreover, even if a comparison in terms of size is difficult, data shows that Eni and the other flags had in common a strategy that promoted the growth of their shipcapacity. This strategy, in all cases, suited the general development in the world oil market. Finally, Eni's position was that of a follower, but the Company was able to carve out a slice of the international oil market and to exploit the competitive advantage of its position with its own agenda.

4) Ports and Eni

The analysis of the management of Eni's oil transport by ship focuses on the relationship between the usability of the port system and the development of operating costs and, therefore, of the efficiency of the service[xci]. Furthermore, the relationship between sea refuelling lines and the oil pipeline network has an important impact due to the development strategies of the Eni group on international markets. The following analysis provides, first, a general outlook on the management of the Italian port system and then the analysis of the construction of an integrated network between tankers and pipelines on the part of companies controlled by Eni.

The condition of Italian ports (1945-1973)

Until 1957 the Italian port system was able to support the increase in traffic. The post-war reconstruction at the end of the 1940s had restored a number of docks and equipment equal to that of the 1930s. Moreover, in that period the operational capacity of ports exceeded the quantity of goods handled in them. If from 1881 to 1939 the total movement of goods went from 10 to 47 million tons, in the decade 1953-1963, the movement increased from 54 to 148 million tons. Between 1953 and 1967, the average annual growth rate of port traffic was 11 per cent. This rate was above the world average of 7.5 per cent. The expansion was determined by the domestic demand for raw materials and fuels. After 1960 there was an increase in imports of petroleum products[xcii].

At the beginning of the 1960s, the port system faced a structural crisis. In the transport of goods, the inefficiency induced by inadequate ports and the difficult combination of maritime and land transport became significant. The inefficiency of ports depended in large part on shallow waters, the insufficient number of berths, the use of obsolete structures and the low productivity of labour.

Then, two new issues fed the crisis. First, the EEC [European Economic Community], by reducing tariffs and abolishing the quota system, would have opened the Italian market to the competition from the foreign industry. Instead, the second matter concerned the decisive orientation of the Italian industrial system towards exports. Until the early 1960s, a sort of compromise remained in force for commercial traffic in ports: the tariff system rebalanced the inefficiencies in productivity of piers. Already from the 1950s, the Association of Italian Industrialists (Confindustria), as well as the public enterprises headed by Eni, aimed at reducing port wages through the liberalization of the labour market. In addition, the proposals of Confindustria, with which Eni agreed, concerned the functional autonomy and also the specialization and integration of ports in a system organized on a regional or national scale. The project of functional autonomy determined a climate of confrontation between 1963 and 1965. The "liberal vision" of ports, however, would not have been accepted until the crisis of the 1970s, also driven by the affirmation of innovations in transport. As a matter of fact, the most innovative transport techniques such as pallets and containers involved new ships, whose management required a restructuring of transport organization. In other words, it was necessary to overcome the long arrival times, the low yields in landing / embarkation, the prolonged stops, the slow sorting of goods.

It is possible to define some phases in public investments in ports for commercial traffic by the Italian government. From 1945 to 1954 the renewal of ports was completed with a total expenditure of 53 billion lire (to 1979), reporting the system at the 1939 levels. The process, which concerned the ports of Genoa, Naples and Venice, was not characterized by particular attention to the evolution of tonnages and the transformation in the composition of product. After the reconstruction program, the State allocated around 24 billion lire between 1958 and 1959, favouring ordinary maintenance. Overall, this trend led to an accumulation of technological delay compared to foreign competitors. Moreover, a modest rate of modernization of railway fixed installations represented a further slowdown in the process of integration between maritime and railway transport[xciii].

The situation would have changed after 1964 with the launch of the "Piano Azzurro" (law 27th October 1965, n. 2000). It was an attempt to respond to the competitive needs originated by the European Common Market with an effort to rationalize and increase infrastructure. Already in 1963, the "Ministerodella Marina Mercantile" (Ministry of Merchant Shipping) indicated among the major problems of ports the clogging of traffic with an increase in costs and a low level of investment. Despite the planning implemented, the positive consequences of the "Piano Azzurro" were limited with a low rate of investment compared to the needs and a slowness in spending capacity. Total billions available for port works amounted to 94 to spend in the five years 1965-1969 and divided over 45 ports. In 1970, the calculations made indicated that only 50 per cent of the initial financing was actually used at the end of the five-year period[xciv].

Eni, ports and refining activity.

The use of ports by Eni's tanker fleet was closely linked to the refining network. The refining companies with which Eni could operate at the time of its institution were Irom (of which Agip held 51% and Anglo-Iranian 49%), owner of the refinery at Porto Marghera; Stanic (whose capital was owned in equal parts by ANCI and by Standard N.J.), owner of the refineries of Livorno and Bari; Sarn (entirely owned by Anic, Agip and Romsa), which managed the Novara's plants for the processing of edible grease and lubricants; Romsa (wholly owned by Eni and Agip), which produced lubricants and bitumen and had a majority stake in ZabbanIdrobitume Ltd. In 1958 Sarn was liquidated and Romsa incorporated into Agip. In the decade 1953-1962 the refineries of Irom (capacity 1.8 million tons) and of Stanic (total capacity of 3.7 million t.) were extended up to a total capacity of 8 million tons. In 1962 the refinery of Anic in Gela (Sicily) was put into operation with a potential production of 3.5 million tons, which led to a total capacity of the group in Italy of 11.5 million t. In the 1960s, Eni also started the project of SannazzarodeiBurgundi (Pavia-Lombardy), with a further potential of 5 million t[xcv].

The Italian refining industry had acquired a clear coastal characterization that allowed it to supply not only the national market but also Mediterranean countries towards which it exported an average of 35-40 per cent of production for the decade 1954-1963. Later, the centralization of consumption in industrial areas favoured the use of oil pipelines for transport from ports within the national territory and the construction of refineries in the immediate vicinity of exploitation industries. This trend took shape with the Sarpom's plant in Trecate (Novara-Piedmont) and the Anic's one in Sannazzaro[xcvi].

In 1958 the Eni group began a refining business abroad by setting up the SociétéAnonymeMarocaine-Italienne de Raffinage (Samir) in Rabat, together with Moroccan public authorities. In 1960, the Ghanaian Italian Petroleum Co. Ltd was created in Accra (Ghaip) and the SociétéTuniso-Italienne de Raffinage (Stir) in Tunis, in joint participation with the Tunisian state. In 1961, the Erdolraffinerie Ingolstadt (Eriag) was created in Ingolstadt and the following year, in Léopoldville, the Société Congo-Italienne de Raffinage(Socir), in equal participation between the State of Congo and Anic. All these plants were established by companies of the Eni group: SnamProgetti and Saipem[xcvii].

At the end of 1962 the construction of the Central European oil pipeline (Cel) began with the trunks Genova - Gran S. Bernardo – Aigle, the Ferrera - Spluga and Ferrera - Chiasso and, in 1966 the Spluga - Ingolstadt trunk was built. Successively Eni, taking over the Ragusa plant from Gulf Italy, managed the 65 km pipeline, from Ragusa to Augusta. In 1971, to upgrade the Cel, Ferrera's depot was connected with a pipeline of 92 km to the British Petroleum refinery in Volpiano (Torino) and with another of 82 km to the Gulf refinery Bertonico (Lodi-Lombardy). Moreover, Eni planned the construction of a trunk of 37 km for doubling the oil pipeline Novi Ligure (Piedmont) -Ferrera (Varese-Lombardy). At the end of 1971 Eni had a network of 771 km pipelines while the national system, comprising other companies, reached a total length of 953 km[xcviii].

The main problem of Eni connected to ports concerned the quantities of crude arriving by sea to supply Italian refineries and petrochemical plants but also, through the Cel and Tal oil pipelines, central European markets. In 1950, Eni managed 5 million tons, 30 million in 1960, and then reached 117 million in 1971. In 1956, Stanic declared that it had transported 3,517,785 tons of crude oil with an increase of 4.3 per cent compared to 1955. 193 tanker journeys had been managed for transport, of which 185 had been made by long-term rent ships (215 journeys in 1957). Stanic aimed to increase the use of ships with higher tonnage, speed and pumping capacity and, at the same time, to proceed with a constant review of refining processes in order to further reduce ship stops at piers. The company noted, however, that the improvements achieved were significant only in Bari, while in Livorno it was urgent to act for the construction of an oil dock. In 1957, the supply of crude oil at port sites was affected by the closure of the Suez Canal, but overall the international clash did not result in a drastic drop in the storage activity in ports, as the costs of freight remained stable. At the end, in 1959 the Eni group's tanker fleet transported 2,927,316 tons of crude oil and petroleum products, 8,488 t. of liquefied gas. Throughout the 1960s, the objective of the Eni group's transport companies was to reduce costs by focusing on the reduction of the stopping period and on the technological innovation in the shipping system given the structural inefficiency of port docks[xcix].

The analysis by sample of the charter contracts of some Eni group’s companies indicates that the most used Italian port facilities were Bari and Venice (Marghera) for the line between the Arabian Peninsula and Central and Northern Europe. At the beginning of the 1960s the port of Livorno represented a consolidated landing, but it managed gradually decreasing quantities while the strategic choices of Eni concerned primarily the use of piers in Genoa for the supply to the refineries in the North of Italy. Subsequently the governance of flows concerned the creation of an integrated port system in Sicily directly controlled by Eni.

Between 1960 and 1966 the development of the refining industry achieved very high levels: the number of complete-cycle plants increased from 35 to 37 but the total installed capacity tripled, going from 40.4 million to 129.3 million tons. Moreover, the average Italian unit capacity had increased from 1.3 million to 3.4 million tons for year. This was still low compared to that of European refineries. The factor that mainly favoured the expansion of refining was the oligopolistic structure of the oil industry. Between 1960 and 1967, the Italian share of the installed capacity increased from 30.9 to 40.8 per cent for large integrated companies and, within this quota, that of Eni rose from 12.3 to 12.7 per cent. African plants were a relevant element of the growth strategy implemented by Eni. In Africa five plants were established: Tunisia, Morocco, Ghana, Tanzania and Congo. These structures added to the mentioned Ingolstadt site (Germany), connected with the port of Genova (in 1965 Eni was building 3 refineries in Yugoslavia, 2 in Brazil and one in Norway, Poland, China, Pakistan and Iraq). In the same period the companies of the Eni’s group invested to enlarge the refineries Irom-Venice, Stanic-Livorno, Amoco-Cremona, LombardaPetroli-Villasanta and Raisom-Augusta.

Eni planned a participation in the S.A. Industrial Port of Ravenna (Sapir) to develop directly the capacity to manage oil from the Middle East. Subsequently, Eni decided investments such as piers, submarine conduits and some port infrastructure extensions in Gela (Caltanissetta-Sicily) and Porto Marghera (Venice-Veneto) to allow the loading and unloading of ships over 50,000 dwt and of super tanks.

In particular, for the Venetian complex, between 1963 and 1965 Irom planned the renewal of the equipment, the assembly of a new turbo-alternator and the increase in storage and distillation with the supply of tanks and equipment from Snam and also a 70 t / h steam boiler made by Breda. Iromlobbied local authorities to develop port infrastructures and complete theMalamocco-Marghera canal with the aim of managing tankers of higher tonnage (in 1966, Irom aimed to increase the scope of the catalytic activities of the plant and obtain a greater production of gasoline. The company modernized the plants for the preparation of lubricating oils, greases and bitumen and with Snamprogetti started a plan for an isomerization unit with the improvement of the quality standards of fuels. Company budgeted cost for 2.6 billion lire. After these interventions, the refinery capacity passed from more than 2 million to 3.5 million tons a year in 1966. The following year the Board of Irom approved the construction of the new "Marghera oil terminal" for the landing of 70 – 80 ton super tankers (up to 120 thousand), the construction of an 11 km sub-lagoon oil pipeline and two 50 thousand cubic meter storage tanks. The cost of the plan was 6.35 billion, partly financed by company resources and partly by bank loans. The ultimate goal was the refining of crude oil for 4 million tons per year[c].

The other refining companies also resorted to the upgrading of port capacities using "non-traditional" means: all the companies used piers and sea-line pipelines located on the seabed up to the buoys or platforms (oil islands) installed off the coast for the docking of tankers, where the seabed had become insufficient. These mobile systems had the disadvantage of being less accessible in adverse sea conditions and less safe. In this context, since 1967 Eni began to lobby the government to prepare a limited number of large terminals, mainly in traditional ports, capable of receiving maximum tonnage tankers in safe conditions. Eni required that most of the national refining capacity (located on site or fed by pipelines or subsequent transport by sea) and the activity of foreign refineries supplied by Italy with international pipelines should be concentrated in these ports. The request was essentially a "plan of ports" that could also solve the problem of receiving dry cargo that combined the transport, refining and distribution phases.

Conclusion

After WWII, oil became the leading energy resource and its market expanded, especially in Western countries. Shipments were the preferred mode to transport oil and, so, naval transportation also increased. In twenty years, from 1953 to 1973, the world oil naval fleet grew about six times. The global environment and the international economic development, as the Suez Canal closures, enhanced the increase in the global fleet. United States, throughout the 'convenience flag' of Liberia, owned the most relevant share of the world oil vessels, followed by Great Britain. Italy had its own share, even if its weigh was small.

Eni, with its flag, was the most important Italian oil company, a state-owned business as other oil majors. The development of Eni's fleet began already at the end of the 1940s, but the first enlargement program was put into action in the early 1950s. The growth strategy aimed, first, to modernise the company's fleet and, second, to obtain a fleet able to satisfy the increasing need of oil transportation of Eni. Moreover, in this phase the Company also focused on the development of ports and, in general, of oil-manufacturing sites. In 1952, Eni's fleet was double compared with the pre-war period. In 1956, with the first Suez Canal closure, the effort to enlarge the fleet intensified. As for the other oil companies, Eni's invested in the development in size of its vessels. The 1960s were the period of maximum expansion in the number of ships owned by Eni and in this periodthe international environment and the competition inside the sector, led to another expansion program. In 1964, Eni's fleet reached the possession peak, with 16 tankers. Finally, the decade ended with a new plan to enlarge the fleet. However, this time there was a reduction in number and a growth in vessels sizeopposite to a growth in the vessels size.

Eni's fleet was always smaller than that of oil majors, but its development followed their lead. The comparison between Eni's fleet with that of BP displays that both undertook the same strategy, even if Eni was a follower. Indeed, BP's fleet maximum development in number occurred in the second half of the 1950s. In addition, Eni never acquired the same capacity as BP, stopping at a tenth of its size, but it's interesting to note that the Company was able to compete in this rather monopolistic market.

Ports and pipelines completed the oil transportation system from extraction areas to refining sites and markets, national and international. Eni was concerned in the development of Italian ports, particularly to make them suitable to the increase in naval traffic after WWII but, above all, to the growth of the company refining activities.

Eni also invested in the creation of pipelines to supply its national and European markets.In particular after the 1960s, when Italian ports had difficulties to assureEni's growth, pipelines became a fundamental asset in the company's– oil transport and so – developing strategies.

The case of Eni points out that transportations were a key factor for, in general, oil multinationals success. Indeed, enterprises profitability – at least to some extent – and their market positioning depended on controlling transport, both on the costs and on the formsside. Furthermore, the research shows that, from the 1960s, oil shipments entered in competition with other transportations forms, essentially pipelines, raising the question whether the different methods are complementary or alternative to each other. Future research will be able to investigate this specific issue more thoroughly.

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[i] Brian C. Black, Crude Reality, pp. 5-8; R. W. Ferrier, The History of The British Petroleum, pp. xviii-xix; JoostJonker, Jan LuitenZanden, A History of Royal Dutch Shell, p. 5.

[ii] 'One of the other noticeable features of crude oil is that it hardly ever seems to occur in the places where it is needed […]. That, of course, is where the tankers come in.'; Stephen Howarth, Sea Shell, p. 18. This is particularly true for Western Europe.

[iii] It's not possible to list here all researches on oil. So, for examples see the literature list in the article.

[iv] James Bamberg, British Petroleum and Global Oil, pp. 2-3.

For some insights on the multinational history see, for example, Robert Fitzgerald, The Rise of the Global Company. Multinationals and the Making of the Modern World, Cambridge, Cambridge University Press, 2015.

[v] The battle for oil resource was made even if in the 1920s the main energy resource in Europe was still coal; Daniele Pozzi, Capabilities, Entrepreneurship, and Political Direction, p. 165.

See also J. G. Clark, The Political Economy of World Energy.

[vi] They were the 'seven larger integrated multinational oil companies' and they emerged in the period after 1900. Five sisters were from the United States and the other two were founded in Western Europe. CompagnieFrançaise del Pétroles 'was to became the unofficial eight sister'; Geoffrey Jones, The State, p. 6.

In 1956, the seven 'oil majors' were: Standard Oil (NY), Royal Dutch Shell, Socony Mobil, Gulf, Texas Company, British Petroleum, Socal; James Bamberg, British Petroleum and Global Oil, p. 2.

Sampson, Anthony. The seven sisters: The great oil companies and the world they shaped. New York: Viking Press, 1975.

[vii]Ibidem, p. 3.

J. H. Bamberg, The History of The British Petroleum Company. Volume 2, p. 4.

[viii] James Bamberg, British Petroleum and Global Oil, p. 8.

[ix] It's important to note that it is necessary to put 'the triumphant march of petroleum into perspective'. Indeed, in 1900 oil satisfied only '4.5 per cent of United States's energy requirements. […]. The growth of its relative importance was much slower in Europe and it did not exceed 25 per cent until the late 1950s'. The dominance of oil was very well established after WWII and before the 1970s oil crisis it provided over 64 per cent of Europe's total consumption of energy'; Geoffrey Jones, The, p. 5.

[x] Ibidem, p. 2.

[xi] List of acronyms: Eni = Ente Nazionale Idrocarburi; Agip = Agenzia Generale Italiana Petroli; Anic = Agenzia Nazionale Idrogenazione Combustibili; Snam = Società Nazionale Metanodotti; Irom = Industria Raffinazione Oli Minerali. Moreover, from now on Company is used to refer to Eni.

[xii] This because British Petroleum [after also BP] and Shell were among the most important oil industries in the world, being among the oil majors, and their cases well displays the process of size-enlargement in the oil ships. Furthermore, they have a 'common origin' with Eni, since they were both founded in European countries.

[xiii] The Italian government decided to set up a state-owned company to control the energy market, especially the hydrocarbons industry, in the country. ENI was created anew and the previous national hydrocarbons companies (Agip, Anic and Snam) were incorporated in it;cfr: Entenazionaleidrocarburi, Relazioni e bilancio al 30 aprile 1954, pp. 11-14.

[xiv]Stanic is a company founded in 1950. Esso (Standard Oil) owned 50% of the company and the other 50% was owned by Anic.

[xv] Cfr. Ente Nazionale Idrocarburi, Relazioni e Bilancio, Roma, 1954-1975.

In the paper, it will use the Italian name for the Eni Annual Report.

[xvi] Geoffrey Jones, The State, p. 1.

[xvii] For an analysis on the dynamics of the oil market see Cobin van der Linde, Dynamic International Oil Markets.

[xviii]Ibidem, pp. 45-71.

[xix]Ibidem, pp. 73-77/93.

[xx] For more details on the development of oil industry see Ibidem, pp. 73-93. Moreover, for a complete series of crude oil production between 1881 and 2000 see Jan Luiten van Zanden, A History of Royal Dutch Shell. Appendices, pp. 48-49. In this series, data are slightly higher than those used here. This can be the result of the sources. Nevertheless, the resulting pattern is the same.

[xxi] Eni, Relazione e bilancio al 30 Aprile 1954, p. 17.

[xxii] Eni, Relazione e bilancio al 30 Aprile 1955, p. 13.

[xxiii] Natural gas and fossil fuels, as carbon, were the other main sources.

[xxiv] Eni, Relazione e bilancio al 30 Aprile 1961, p. 11.
[xxv] Eni, Relazione e bilancio al 30 Aprile 1955, p. 19.
[xxvi] Eni, Relazione e bilancio, variousyears, passim.
[xxvii]Ente Nazionale Idrocarburi, Relazione e bilancio al 30 Aprile 1955, p. 43.
[xxviii] In the case of refining, at least until refineries moved closer to consumption markets during the 1960s.
[xxix] Unfortunately, the sources don't allow – for the moment– to have a complete series. However, data provide at least some inputs on its development during these twenty years.
[xxx] For example, in 1954 there was an increase of 2,660,142 tons of dwt compared to 1953 and this growth 'contributed to improve the quality of ships'. It's also interesting to note that in this year, new ships started to operate and 'a strong contingent of T.2 and Liberty-Tankers was dismissed because of its high service costs; EnteNazionaleIdrocarburi, Relazione e bilancio al 30 Aprile 1955, p. 22.
[xxxi]Ibidem, pp. 44, 46.
[xxxii] Stephen Howarth, Sea Shell, pp. 131-132. These principles, stated in the Shell case, can also applied in general, especially for European oil multinationals.
[xxxiii] James Bamberg, British Petroleum and Global Oil, p. 297.
[xxxiv] Several information on Agip's fleet during and after the Second World War can be found in: Francesco Di Nitto, Uomini e navi, p. 24 and following pages.
[xxxv] Agip, Bilancio al 31 dicembre 1950, Rome 1951, p. 32.
[xxxvi] The boom of hydrocarbons consumption in '50s-'60s Italy is documented by Pier Angelo Toninelli, Energy supply and economic development in Italy. The role of the State-owned companies, in A comparative history of national oil companies, ed. Alain Beltran, Brussels, Peter Lang, 2010, pp. 125-142. On the connections between post-war economic development and society of mass-consumption in Italy, with specific reference to the oil sector, see also Elisabetta Bini, La potentebenzinaitaliana, 2013.
[xxxvii] Agip, Bilancio al 31 dicembre 1951, Rome 1952, pp. 15-16.
[xxxviii] Agip, Relazioni e bilancio al 31 dicembre 1953 (attached to: Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1954), Rome 1954, pp. 15, 19 and 44.
[xxxix]Cf. Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1956, Rome 1956, pp. 46-51.
[xl] Bamberg, British Petroleum and global oil, cit., pp. 291-292. On BP and Shell's cases, cf. in particular Stephen Howarth, Sea Shell and William J. Harvey, Raymond J. Solly, BP tankers.
[xli] Agip, Relazioni e bilancio al 31 dicembre 1955 (attached to: Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1956, cit.), p. 40.
[xlii]Cf. Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1955, Rome 1955, p. 58.
[xliii]Cf. Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1956, cit., p. 106.
[xliv] In addition, one must consider that the Suez Canal closure removed one of the major constraints to build larger vessels, since its transit capacity limited the passage to loaded ships of no more than 45,000 tons. On all these aspects, see Alastair D. Couper, The geography of sea transport, pp. 114-115.
[xlv] Agip, Relazioni e bilancio al 31 dicembre 1956 (attached to: Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1957), Rome 1957, pp. 29 and 42.
[xlvi] Francesca Carnevali, Il gruppo Eni, pp. 40-42. The formal transfer of the whole ownership of the fleet from Agip to Snam took place three years later, in 1960.
[xlvii] Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1958, Rome 1958, pp. 203-204; Agip, Relazioni e bilancio al 31 dicembre 1957, ivi, p. 46.
[xlviii] Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1960, Rome 1960, p. 62.
[xlix]For thesefigures, see Archivio Storico Eni (hereafter ASE), Fondo Eni organi sociali (FEOS), Libri verbali Giunta esecutiva, November 30, 1960, pp. 186-188 and 211; Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1961, Rome 1961, pp. 62-63.
[l] On the technological evolution of the tanker building industry, see Raymond J. Solly, Tanker. The history and development and Andrew G. Spyrou, From T-2 to supertanker.

[li] About this point, cf. Leonardo Maugeri, The age of oil. The mythology, chap. 7 (in particular pp. 87-91). On Eni's situation during the '60s, see more in general Franco Briatico, Ascesa e declino.

[lii] Cf. Daniele Pozzi, Dai gatti selvaggi, chap. 10. For a comparative overview on this aspect, see Francisco Parra, Oil politics, chap. 2.

[liii] In this respect, see Van der Linde, Dynamic international oil markets, cit., chap. 4; Daniel Yergin, The prize, chap. 25.

[liv] Cf. Bruna Bagnato, Prove di Ostpolitik, chap. 5 (data at p. 382). With regard to Soviet offensive on European energy market during the Cold War years, see: Per Högselius, Red gas;JeronimPerović (ed.), Cold War energy.

[lv] On thispoint, see ASE, Fondo Snam, b. 186, f. 9DF, Settore trasporti marittimi. Sezione Tecnica. Documentazione relativaainvestimenti, immobilizzazionitecniche, serviziooleodotti. 1963-1966. On the importance assumed by the "midstream shift" in the world oil scenario of the '60s, with a special attention to Eni's case, cf. Roberto Cantoni, Oil exploration, chap. 4.

[lvi] Cf. the files ASE, Fondo segreteria del presidente Girotti, b. 1, f. 2F00, Snam. Servizio trasporti marittimi, stradali e ferroviari. 1959-1966 and ASE, Direzione programmazione, b. 60, f. 39EC, Snam. Investimenti. 1962-1968.

[lvii] Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1962, Rome 1962, p. 53 and Relazioni e bilancio al 30 aprile 1965, Rome 1965, p. 57.

[lviii] ASE, FEOS, Libri verbali Giunta esecutiva, May 18, 1965, p. 138.

[lix] Cf. ivi, pp. 151-152. The crucial matter for the oil industry, concerning the achievement of the right balance between port infrastructures and tanker or pipeline transport, has been analysed with reference to the transnational Rhine region's case by Marten Boon, Multinational business and transnational regions. A transnational business history of energy transition in the Rhine region, 1945-1973, New York-London, Routledge, 2018, part II.

[lx]On this agreement cf. ASE, FEOS, LibriverbaliGiuntaesecutiva, November 24, 1965, pp. 189-191.

[lxi] On '60s Eni's gas strategy, see AlessioZanardo, Unastoriafelice., chap. II.

[lxii] Ente nazionale idrocarburi, Relazioni e bilancio al 30 aprile 1965, cit., p. 12.

[lxiii] In thisrespect, see ASE, Fondo Snam, b. 4, f. 8A6, Sezione trasporti marittimi. Documentazione varia sul canale di Suez. 1966-1973.

[lxiv] Ente nazionale idrocarburi, Relazioni e bilancio al 31 dicembre 1967, Rome 1968, pp. 51-52; ASE, FEOS, Libri verbali Giunta Esecutiva, January 9, 1968, p. 50.

[lxv] The percentage decrease was lower if measured in tons per mile: from 25.265 in 1967 to 20.030 million tons per mile in 1968 (-20.7 per cent). Ente nazionale idrocarburi, Relazioni e bilancio al 31 dicembre 1968, Rome 1969, p. 56; ASE, FEOS, Libri verbali Giunta esecutiva, February 28, 1969, p. 191.

[lxvi] Ente nazionale idrocarburi, Relazioni e bilancio al 31 dicembre 1968, cit., p. 142.

[lxvii] For all this information see: ASE, FEOS, LibriverbaliGiuntaesecutiva, November 8, 1968, p. 135 and December 20, 1968, p. 156 and pp. 166-167.

[lxviii] Ente nazionale idrocarburi, Relazioni e bilancio al 31 dicembre 1969, Rome 1970, p. 53.

[lxix] According to Eni's sources, the fleet managed by Snam transported 7.9 million tons of oil products in 1970. This figure, though, included also third-party charter operations. On this point, cf. Entenazionaleidrocarburi, Relazioni e bilancio al 31 dicembre 1970, Rome 1971, pp. 54-56.

[lxx] In this respect, cf. ApostolosPapanikolaou, Tanker design and safety, pp. 285-320.

[lxxi] Stephen Howarth, Sea Shell, p. 131.

[lxxii]Ibidem, p. 128

[lxxiii] James Bamberg, British Petroleum and Global Oil, p. 290.

[lxxiv] More details in paragraph n. 2.

[lxxv] R.W. Ferrier, The History of the British Petroleum Company, p. 263.

The BP's flag had a Red Ensign and this flag was also used by the Eastern trading British Petroleum shipping companies, such as P&O, Orient, the City Line, Clan, Blue Funnel, Glen, the Ben Line and

the oil tankers of Anglo-Saxon (Shell's shipping subsidiary) and of the British Tanker Company (the BP's shipping subsidiary).

[lxxvi] In 1920, BP fleet's total dwt was just under 270,000 tons; R.W. Ferrier, The History of the British Petroleum Company, p. 525.

[lxxvii] More details in Ibidem, pp. 525-537 and J. H. Bamberg, The History of the British Petroleum Company. Volume 2, pp. 134-141, 287-292.

[lxxviii] Stephen Howarth, Sea Shell, pp. 17, 28.

[lxxix]Bataafsche Petroleum Maatshappi (after also Bataafsche) was created to handle production, manufacture and refining. Anglo-Saxon Petroleum (after also Anglo-Saxon) and Bataafsche were part of the new Royal Dutch/Shell Group;Ibidem, pp. 53-55. For more details on the agreement and for its reasons see Ibidem, pp. 50-53.

Other changes occurred in the company's structure but the most relevant for the fleet was the creation of the Shell Tankers (U.K.) Ltd. who was the operating company of the British's fleet from 1964; Ibidem, p. 146.

It's important to note that, to not create misunderstanding, in the paper we choose to continue to use the more general 'Shell fleet'.

[lxxx] Stephen Howarth, Sea Shell, p. 80.

[lxxxi] James Bamberg, British Petroleum and Global Oil, p. 290.

[lxxxii] 'Between the end of the war and 24th December 1951 the Company saw the delivery of fifty-seven 12,000 tonners. By 24th December 1951 no fewer than ninety-three ships of this size had been built for or acquired by the Company'; James Bamberg, British Petroleum and Global Oil, p. 290.

[lxxxiii] Stephen Howarth, Sea Shell, p. 91.

[lxxxiv]Ibidem, p. 125.

[lxxxv] '[…] in 1953 a new company, Shell Tankers Ltd, was registered in London and, at the beginning of 1954, was given management of Anglo-Saxon vessels; Ibidem, p. 128.

[lxxxvi] However, it's important to note that the Iranian oil nationalisation in 1951 had already led to the enlargement of oil vessel size. In particular, 'the direct effect [of Iranian nationalisation] was on BP alone, but indirectly the shape of the oil industry and its shipping began to be altered'. Refineries must be built in 'secure localisation, close to the markets of western Europe' and also able to be supplied from any source;Ibidem, p. 140.

[lxxxvii] Furthermore, in 1960 Shell's 71,250 tons Serenia was launched, followed in 1963 by BP's first 70,000 tonner; James Bamberg, British Petroleum and Global Oil, p. 294.

[lxxxviii] Stephen Howarth, Sea Shell, pp. 137-144. Moreover, in 1960, the Eagle fleet passed to Shell Tankers, further expanding the fleet both in numbers and size; Ibidem, p. 143.

[lxxxix] Unfortunately, it's not possible to add the development in numbers of Shell fleet. However, as pointed out, this company undertook a development path very similar to that of BP, therefore for the purpose of this analysis it seems sufficient emphasize the data on BP. Future analysis could deepen in this regard.

[xc] Personal analysis from Figure 11.2 in James Bamberg, British Petroleum and Global Oil, p. 297.

[xci] Moreover, 'port facilities at either end of the voyage' were 'practical trading limitations' that influenced both vessels size and oil trading profitability; Stephen Howarth, Sea Shell., pp. 130-131.

[xcii] G. Maragliano, Il traffico portuale nel 1948-1967, pp. 75-81; G. Pala, M. Pala, Lo sviluppo, pp. 344-345; C. van der Linde, Dynamic International OilMarkets..

[xciii] CNEL, Osservazioni e proposte sui problemi concernenti lo sviluppo dei porti marittimi italiani, Assemblea, 9 dicembre 1963, n. 38/37. Seealso Istat, Statistiche della navigazione marittima, vol. 39, Roma 1988, pp. 53-55.

[xciv] Ministero della Marina Mercantile, Indagine sui porti petroliferi italiani, Tip. Editrice Cavour, Roma 1968.

[xcv] Archivio Eni, Relazioni e bilanci Snam, 1958 e 1962.

[xcvi] Ibidem, 1953-1963.

[xcvii] Ibidem, 1958, 1960, 1961.

[xcviii] Archivio Eni, Eni Relazioni e bilancio 1966 e 1971
[xcix] Ibidem.
[c] Ibidem.