The contribution of Coastal Shipping in the Regional Development of the Greek Islands. The Case of the Southern Aegean Region

Sambracos, Evangelos

University of Piraeus

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E. SAMBRACOS
Associate Professor
Dept. of Maritime Studies
University of Piraeus, Greece
E-mail: sambra@unipi.gr

Summary

The current article examines the interdependent relationship between the Greek coastal shipping system and the economic development of the Greek regions, with emphasis on the Southern Aegean islands. The methodology that is followed is based on the hypothesis that regional development is the balanced economic development of the remote island regions, as well as the Greek mainland. Available data on development of the Southern Aegean region, point to two basic sectors of economic development, the tertiary and secondary sectors, with tourism being the most important leverage of economic development. The transport sector is an important production factor since it ensures the functioning of the supply chain and the distribution of the tourism product. At the same time the isolation and the geographical distribution of the island regions demands the existence of a continuous and unbreakable communication between the island regions and the Greek mainland. Coastal shipping constitutes the most important means of transporting goods, and the primary means with over 70%, of passenger transportation. Therefore the proportional relationship between coastal shipping and the regional development of the Southern Aegean islands becomes evident.

Key Words: coastal shipping, regional development, transportation, Aegean.

1. Introduction

The role of coastal shipping and transportation in general is a field of study for its contribution to the economy and the regional development. It is a fact, that in Greece regional development has been connected to the available infrastructure and the development of the transportation network. However, due to the fact that many regions have been left outside this network, they show a lower rate of development in comparison with the rest of the country. Such regions include Epirus, Thrace, the Aegean islands, that unfortunately constitute isolated human-geographical entities. The aim of this article is to investigate the special role that the country's coastal shipping system plays in the formation of a rationalized transportation system and its contribution to the national economy and regional development. The development foundations of the Southern Aegean region are studied and the relationship between coastal shipping and regional development is investigated.

2 Development characteristics of the Southern Aegean region

2.1 General

The Southern Aegean region includes two prefectures (Cyclades and Dodecanessus), and consists of 42 inhabited islands while stretching in a geographical zone 400km long and 150km wide, starting from Attica up to the SW coast of Asia Minor.

The region's basic characteristics are:

- Geographical discontinuity and multi-dispersion

- Economic and social independence of the islands
- Small hinterlands
- Small markets

The geographical dispersion of the region has as a result the independence of the islands and a relative autonomy in economic and social levels. This autonomy is observed in various production sectors and mostly in the primary sector (agriculture, stockbreeding, mining) with the existence of a significant dependence on the territorial, geological and climate characteristics of each separate unit. The secondary sector (industry, handicraft) is in general terms underdeveloped mainly due to the dependence on outside input, as well as to the high transportation costs. Finally the tertiary sector and especially the tourism services present a significant development with an important contribution to the economic development of the region. Autonomy in the tourism development of the islands is also observed, since it dependent on many factors such as the existence of either natural or man-made tourism resources.

There are however many common points in the economic and social life of the islands, which can explain the existence of a common regional policy. These include the transport connection of the islands with the mainland, as well as within the islands themselves.

2.2 Economic Development indexes of the Southern Aegean region

2.2.1 Gross Domestic Product (GDP)

For the period between 1971 - 1991 the Gross Domestic Product of the Southern Aegean region is shown in the following table for the prefectures of Dodecanese and Cyclades as well as the country's total. As it can be seen the region's GDP constitutes between 2,3% and 2,8% of the country's total GDP.

Table 1: Gross Domestic Product of the Southern Aegean region
(mil drh. in const. prices 1970)

	1981	1991	1994
Southern Aegean region	9,52	13,896	13,944
Dodecanese	5,554	9,14	9,63
Cyclades	3,966	4,754	4,31
Total country	418.271	498,424	501,533
% GDPof S.Aegean region / total GDP	2,3%	2,8%	2,8%

Source: Hellenic National Statistics Services, Statistical Tables of Greece

The GDP per person for the region and the country's total is derived according to the following table.

Table 2: Gross Domestic Product per capita of the Southern Aegean region
(drh. in const. prices 1970)

	1971	1981	1991
Southern Aegean region	25.384	40.767	53.956
Dodecanese	26.219	38.284	56.279
Cyclades	24.212	44.840	49.990
Total country	31.767	42.942	48.664

Source: Hellenic National Statistics Services, Statistical Tables of Greece

According to the above data, the Southern Aegean region's Gross Domestic Product per capita nears that of the country and it is higher than that during 1991. This means an important economic development of the region, always in relationship with the rest of the country. According to the following table the tertiary sector constitutes over 50% of the total

GDP per person of the Southern Aegean region, which means that over 50% of the region's economic development is attributed to this sector's development.

Table 3: Participation of the production sectors in the Gross Domestic Product of the Southern Aegean region (in const. prices 1970)

	1981			1991			1994		
	A' Sector	B΄ Sector	C΄ Sector	A΄ Sector	B΄ Sector	C΄ Sector	A΄ Sector	B΄ Sector	C΄ Sector
Southern Aegean region	15%	28,5%	53,9%	11,2%	19,9%	68,8%	9,8%	15,5%	74,8%
Dodecanese	10,3%	23,7%	65,9%	8,1%	16,3%	75,5%	4,6%	13,4%	82,0%
Cyclades	23,2%	35,1%	41,6%	17,2%	26,8%	56%	21,4%	20,2%	58,5%
Total country	17,7%	30,7%	51,6%	17,4%	27,6%	57,2%	14,9%	25,0%	60,0%

Source: Hellenic National Statistics Services, Statistical Tables of Greece, different years

Table 4: Participation of the production sectors in the Gross Domestic Product per person of the Southern Aegean region (in const. prices 1970)

	1971			1981			1991		
	A' Sector	B΄ Sector	C΄ Sector	A΄ Sector	B΄ Sector	C΄ Sector	A΄ Sector	B΄ Sector	C΄ Sector
Southern Aegean region	19,4	28,7	51,9	15,6	28,5	55,8	11,2	19,9	68,8
Dodecanese	16,3	25,1	58,4	10,3	23,8	65,9	8,2	16,3	75,5
Cyclades	24,0	34,2	42,0	23,2	35,1	41,6	17,2	26,9	56,0
Total country	18,5	31,9	49,9	17,7	60,7	51,6	17,4	27,7	57,2

Source: Hellenic National Statistics Services, Statistical Tables of Greece, different years

2.2.2 Employment

Studying the employment in the Southern Aegean region as well as the participation of each sector in the employment in each prefecture the following table is obtained, according to which, the majority of the employees is located in the tertiary sector, with the secondary following behind.

Table 5: Structure of Employment in the Southern Aegean region

	A΄ Sector	B΄ Sector	C΄ Sector	Processing/ Manufacturing	Other	Active population	Unemployment Ανεργία (% of active population)
Southern Aegean region	12,67%	25,9%	61,44%	8,13%	11,72%	36,74%	5,57%
Dodecanese	7,9%	23,6%	68,5%	7,55%	12,1%	37,38%	5,28%
Cyclades	21,4%	30,2%	48,4%	9,23%	11,04%	35,61%	6,1%
Total country	19,56%	25,41%	56,03%	14,64%	15,36%	37,87%	8,1%

Source: Hellenic National Statistics Services, Statistical Tables of Greece, different years

2.3 Population, density and movements

Taking into consideration the population of the Southern Aegean region based on the census of the years 1971, 1981 and 1991 as well as the population density, the following characteristic data can be obtained[1]:

- The region constitutes 2,5% of the total country population (1991) with a population of 257.481 inhabitants.
- 63,5% of the region's population comes from the prefecture of Dodecanese (163.476 inhabitants) while the rest 36,5% comes from the prefecture of Cyclades (94.005 inhabitants).
- The last three decades (1971-1991) the region's population has had an average increase of 11,44%, which is 3% more than the average yearly change rate for the whole country (8,17%).
- The prefecture of Dodecanessus had the greatest population increase with an average yearly change rate of 16,22% while the prefecture of Cyclades showed an increase of 4,35%.
- Regarding the population density it is shown in lower levels than the country, while the prefecture of Dodecanessus shows a higher density than the prefecture of Cyclades.

Table 6: Population (inhabitants) and population density (inhabitants/km²) 1971-1991

	1971	1981	1991	MARC (%) 1971-1991
Southern Aegean region				
- Population	207.354	233.529	257.481	11,43
- Density	39,29	44,25	48,8	11,4
Dodecanese				
- Population	121.017	145.071	163.476	16,22
- Density	44,74	53,63	60,43	16,2
Cyclades				
- Population	86.337	88.458	94.005	4,35
- Density	33,55	34,38	36,53	4,3
Total country				
- Population	8.768.641	9.740.417	10.259.900	8,17
- Density	66,47	73,84	77,65	8,0

Source: Hellenic National Statistics Services, Statistical Tables of Greece, different years

Regarding population movements in the Southern Aegean region, they have a seasonal nature and are caused mainly due to the intense tourism flow during the summer period. The rate between permanent and seasonal inhabitants is presented in the following table[2]. According to this table this rate for the complete region is almost 1:2,5 with the prefecture of Cyclades surpassing the prefecture of Dodecanessus, since it has a seasonal population four times greater than the permanent.

Table 7: Rate between Permanent and Seasonal population 1997

	Seasonal population/permanent population
Dodecanese	1,64 (306.630/188.687)
Cyclades	4,29 (434.750/101.281)
Southern Aegean region	2,57 (741.380/287.968)

Source: "I. Kapodistrias Plan"

[1] NSSG, Population Census 1971,1981,1991.
[2] «Plan I. Kapodistrias»

2.4 The tourism stand in the Southern Aegean region

Tourism is the main activity for the Aegean islands as far as its contribution to the region's GDP, the creation of work places and income. At the same time, tourism supports the development of other branches of the economy, such as services, agriculture, transportation, etc.

Characteristically it can be noted that the number of people occupied in tourism in the Southern Aegean region which constitutes the most numerous island complex has been increased five times during 1971-91. Furthermore the average yearly rate of change in the employment in tourism during the period 1981-97 (9,18%) is the greatest in the country, while the development of the region's hospitality potential shows an increase. It is also noted that this area came first in the total number of overnight stays and the percentage of average yearly completeness for the year 1997.

The most advanced island in tourism is Rodos, which has a percentage of arrivals over 45% and overnight stays over 50% of the total tourist flow of the whole region, with the island of Kos coming second. Regarding tourism movements, the majority is foreign tourists mostly to the larger islands (Rodos, Kos, Samos, Santorini, Mykonos, etc) while in islands such as Cythnos, Serifos, Sifnos, Milos, etc, the majority of the tourists are Greeks.

Table 8: Hotel capacity Southern Aegean region (1981-1997)

	No. of beds			**% allocation of beds**			**MARC (%) No. of beds**
	1981	**1990**	**1997**	**1981**	**1990**	**1997**	**΄81-΄97**
Southern Aegean region	37.333	71.386	104.306	13,5	16,29	18,7	6,63
Dodecanese	10.230	22.446	33.488	3,58	5,12	5,8	7,69
Cyclades	47.563	93.832	137.794	16,63	21,41	23,87	6,87
Total country	285.991	438.249	577.259	100	100	100	4,49

Source: Hellenic National Statistics Services, Statistical Tables of Greece, different years

Regarding the means of arrival of the tourists to the Southern Aegean region islands, with the exception of Rodos the vast majority of the visitors moves by boat using the coastal shipping network of the islands.

Table 9: Passenger movement to the Southern Aegean region islands in 1994

Συνδέσεις	**By airplane**	**By coastal transport**	**Total traffic**
	% of total traffic	% of total trafifc	
Athens -Kos	47,5%	52,5%	231.936
Athens - Rhodes	52,9%	47,1%	535.163
Athens - Kassos	1,5%	98,5%	2.275
Athens - Karpathos	39,4%	60,6%	20.535
Athens - Astipalaia	26,3%	73,7%	8.318
Athens- Leros	16,4%	83,6%	46.826
Athens - Syros	9,2%	90,8%	216.203
Athens - Myconos	26,0%	74,0%	492.923
Athens - Santorini	34,9%	65,1%	403.120
Athens - Milos	20,1%	79,9%	82.396
Athens -Paros	7,5%	92,5%	599.330
Athens - Naxos	4,8%	95,2%	325.161
Average.	23,8%	76,2%	

Source: Hellenic National Statistics Services, Statistical Tables of Greece

3 Coastal shipping transport

According to the above it can be seen that coastal shipping undertakes the greatest part of the tourism flow to the island regions, whether for domestic tourism, or for foreign visitors. Especially for the smaller islands, that have no airports and ships constitute their only means of transportation, the frequency and regularity of itineraries connecting them with the major mainland ports or with the nearest regional centers, is a decisive factor in being chosen as a destination for tourists. There is also a two-way relationship, since increased demand creates a motive for more regular transportation connections.

It is therefore obvious, that as the service level and service quality offered to tourists increases, the tourism product improves, which in effect has multiple positive effects to the islands' economy and development. Transportation also constitutes an indispensable part of the tourism product, while its quality and cost is a factor, which increases or reduces the tourism service[3].

At the same time through coastal shipping, whether passenger or cargo, commodities are being transported to the islands, which are a necessary input for the development of all the production sectors, as well as to cover human needs.

Table 10: Goods transported through Coastal shipping in the Southern Aegean region 1997
(in metric tons)

Port	Loaded	Unloaded εμπορεύματα
Amorgos	2070	17465
Andros	0	10634
Astipalaia	2006	17971
Thira	32414	98661
Ios	9762	42502
Kalymnos	22584	85995
Karpathos	10916	72328
Kasos	5586	12609
Kea	3483	60690
Kythnos	3543	11624
Kimolos	0	32185
Kos	31580	224076
Leros	48732	87495
Milos	779769	93989
Myconos	17389	250742
Naxos	119742	104860
Nisyros	236223	221608
Κύθνος	0	
Paros	169750	178566
Patmos	4519	52089
Rhodes	169255	453964
Ssserifos	4791	25643
Sifnos	4811	46425
Symi	4086	219967
Syros	72065	157863
Tinos	11162	100495

Source: Merchant Marine Statistical Tables 1997

[3] Sambracos E., "The contribution of transportation services in the tourist development of Greece", 3th One Day Conference on Transportation Economics, 20 May 1999, University of Piraeus.

3.1 Characteristics of the coastal shipping transportation network

The coastal shipping transportation network appears especially complex, since it includes:

- Over 100 islands,
- 190 passenger ports 150 of which service coastal shipping lines,
- complete cover of the island region throughout the year,
- over 1000 ships, which can be classified as follows
  - Passenger- ferries (>100grt): 501
  - Passenger-ro-ro cargo: 318
  - Passenger -Catamaran: 7
  - Passenger : 143
  - Cargo: 271
  - Cargo liners : 4
- 1200 direct connections between ports with a frequency of at least once per week,
- 40.000.000 passengers per year,

Additional characteristics of the existing coastal shipping network include:

a. Port infrastructure

Port infrastructure remains an important factor in the development or degradation of coastal shipping transportation. Today besides the major mainland ports, especially those of Piraeus, Thessaloniki and Patra which have adequate infrastructure, the majority of the ports in the islands show many deficiencies. The basic issues where deficiencies appear regard the functionality of the ports and the service of the passenger flow, as well as the connection with the rest of the transportation network. Specifically:

- it is not possible to service more ships at the same time and there is a lack in flexibility in servicing different types of ships. Most of the ports have limited piers which makes it impossible to service many ships simultaneously. Additionally most of the ports service almost exclusively passenger or ferry ships, while the infrastructure to service other functions, like transportation of commodities, is nonexistent
- the ports lack reception and waiting areas for the passengers
- a lack of road infrastructure is observed, and also there is no organization of the surrounding service areas, which result in important traffic congestion problems around the port area.

b. The fleet

The average age of the passenger and ferry ships is almost 25 years. It is obvious that the aged fleet is incapable of dealing with the modern needs of service quality, safety and comfort. The age of the fleet creates other problems, like reduced speed and comfort as well as the low quality of the hospitality and other services that ships offer.

Of course, due to the abolition the cabotage rights in coastal shipping and the deregulation of the market, the last years the Greek coastal shipping community has undertaken important investments in order to upgrade the coastal shipping fleet, with the introduction of new technology ships, which already offer high quality services.

c. The seasonality of demand

The demand for coastal shipping transportation being a derivative[4] is affected by the trends in the economy sectors that it services, like tourism and trade. In the case of passenger

[4] Sambracos E.(2001) "Introduction in Transportation Economics" Stamoulis Publications

transportation, a significant seasonality appears, with the demand rising dramatically during the summer months. The result of this situation is that during peak periods the existing supply is not capable of covering the added demand, which further causes problems in the service levels and the quality of the transportation service (delays, lack of available seats). In the case of cargo transportation by the coastal shipping fleet no major seasonality effect is observed due to the islands' need for supplies throughout the year.

d. The coastal shipping network

The existing coastal shipping network shows a star-like form with the port of Piraeus being the most important point in the transportation network. This means that the majority of the coastal shipping lines starts and ends at the port of Piraeus, which causes important congestion and delay problems to the port, especially during peak traffic periods.

Additionally the cargo flow has been connected to the passenger flow with the result that problems exist in the service of both the flows. The basic effects of this are congestion in the port area, delays in embarkation and disembarkation and the inability to offer high quality services to the passengers.

4. Coastal shipping and regional development

The meaning of regional development is closely connected with the balanced economic development of the center with the Greek island regions. According to the above presented data, the economic development of the Southern Aegean region is directly related with the secondary and tertiary production sector, with tourism being in most of the cases the primary factor for development. Moreover, for the import of raw materials and other products is needed for the development of all the production sectors, in order to secure a high life quality for the inhabitants. In order to activate all the above factors of development and prosperity it is important to ensure the transportation of passengers and goods.

The nature of the tourism service is such that it is consumed in its place of production. This means that in the production and supply chain there is an important and irreplaceable link, the transportation. It is understood that the transportation infrastructure is a strategic factor for the existence, preservation and development of a tourism flow to and from the regions. Transportation is an integral part of the tourism activity, and for some tourist areas it constitutes an important part of the tourism expenditure. The parallel development of both sectors and their equal relationship can greatly contribute in the qualitative development of the tourism product with a multiplying effect in employment and income. Furthermore, transportation in itself can become an attractive part of the tourism product, a fact that mainly affects sea transport and maybe also combined transport. On the other hand, the low quality or the high transportation costs produce a negative effect in the demand for transportation and consecutively tourism services. In this case, transportation not only contributes in the tourism development, but can also function as a preventive factor for the sector.

Furthermore, the continuous and regular transportation of goods is necessary so that all the production sectors and mostly the industry can be developed. It is obvious that the non-rational organization of the transportation of goods increases the transportation cost, which constitutes a significant part of the total cost, therefore making the transportation financially non-profitable.

It can be seen that any hindrance or interruption in the supply of transportation services will produce negative consequences to the social and economic development of the islands and in effect imbalance the relationship between center and regions. The weaknesses that appear in the current coastal shipping network impede the rational execution of the passenger and goods flow to and from the regions. More important for the transportation of goods, the

absence of alternative means of transportation (like the airplane for passengers) places a greater importance on coastal shipping. It is therefore necessary to deal with the problems that the network suffers from today, taking into consideration the special seasonality that the sector has, which further impedes the situation.

5. The contribution of the Community's policy on Transportation

The above coincide with the policy that the European Union forwards in the framework of the economic unification of transportation. Important in this aspect are the Community's proposals on the reinforcement of the regions as well as the development of an intra-European transportation network, by assisting environmentally friendly transportation means, such as short-range shipping and the railway. The above strengthen the importance of the relationship between sea transportation and regional development in the Southern Aegean. This framework includes also the development of the combined transport, which in the case of the Southern Aegean region can be applied through the development of a road-sea or in the case of foreign tourists, air-sea transportation network.

The European direction towards the improvement of the door to door supply chain through the development of small containers[5], is considered especially important. It is a practice that can have significant results for the South Aegean islands, as well as for the whole of the Greek island and mainland regions, due to the existing inability in the utilization of the advantages that regular containers have. The later cannot be utilized in the case of the Greek islands, even though they have important advantages in matters such as cost, loading/unloading times, damage levels and cargo damages, co-operation with all the transportation means (ship, train, truck), door to door service, delivery dates, customer satisfaction, etc. The Greek islands are a region with geographical discontinuity and isolation, with small hinterlands and small and isolated markets. Moreover the ports are characterized by limited container handling installations, with the result that the advantages of unitisation (small times, low handling cost, etc) cannot be utilized. Furthermore the topography of the Greek islands, with the small villages and the narrow roads make the use of containers even more difficult, producing the additional need for warehouses to store the commodities. This in turn means added time, added cost and the danger for pilferage and damages. The development and use of small containers in the European area proves especially interesting, since it participates in the amelioration of the door to door transportation chain. Studies that have already been composed regarding the use of small containers in European countries and their application in specific transportation sectors, have located their advantages in the following issues:

- Loading/unloading times and cost, since due to their size they do not require high investment in equipment (as is the case with conventional containers), neither do they require significant time for handling.
- Coverage of small geographical markets, where conventional containers are underutilized.
- Ease of transportation, mostly due to their small size.

6. Epilogue - conclusion

The coastal shipping network appears to be instrumental not only in the supply chain of the Greek islands, but also in the distribution of the tourism product. At this time there are auspicious prospects for the regional development of the Greek islands, from the side of the

[5] European Cooperation in the Field of Scientific and Technical Research, EUCO-COST/339/1/00 "Technical and Economic Conditions for the European-wide Operation of Small Containers"

transport services offer. New technologies in the ships with high speeds and transport quality, are implemented in view of the deregulation of the coastal shipping market. Thus, regional development is also in line with the European policy, which promotes the balanced economic development in its regions as well as the development of environmentally friendly transportation means, like the sea transportation system. Also, the international level the economic coherence and the globalization does not allow for the existence of isolated units, especially in national levels. From the demand side, the increased tourist row towards the Greek islands contributes positively to their development. Consequently, the Greek state needs to correspond to the challenges and take all necessary actions that will promote regional development and will benefit the National Economy as well as the balanced and equal treatment of its citizens.

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