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Exploring Operational problems of the goods supply chain in the Greek islands: Towards a reengineering of the system

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Abstract

The present paper refers to the subject of provisioning the Greek insular market and identifying the problems of the current transport system. This concern stands within the framework of the European Union for the optimization of door to door transport chains in Europe. In discovering and identifying the weaknesses of the current system, first there is a reference to the special character of the Greek market consisting of numerous islands. Data is included regarding the current transportation system, the fleets and the goods transferred and also the weaknesses and drawbacks observed in the current transport chain. Taking the above observations and the gathered data into consideration, the paper ends with some conclusions and brainstorming with regard to the redesign and reengineering of the system that will allow for a door to door supply chain in this sensitive region for the Greek economy.

1. Introduction

A critical factor for the Greek economic and social development could be considered the provisioning of the Greek insular market. Greece due to its geographic location and the high coastal formulation, shows a significant cluster of islands in the Aegean and Ionian sea. The goods' carriage to the Greek islands is currently supported by a transport system consisting of the Greek Passenger Coastal Shipping and a fleet of cargo vessels.

This system today seems inadequate since it is based mainly on the passenger fleet and there is no special flow for the cargo movement. The transportation of goods is conducted by road carriers (trucks), that carry goods from the point of origin to the point of destination via passenger vessels, performing a sort of a Ro-Ro transport. Additionally, there is another fleet of small cargo vessels that carry mostly commodities with a relatively smaller activity. The need is towards the establishment of a system that allows for the effective and low cost flow of goods. In order to proceed to such a system it is essential to examine the trends that the E.U. examines in this field.

2. New trends in the carriage of goods

Internalization has created new challenges for the transit of goods and the supply of the European market. At the same time, the new business environment sets new transportation needs and standards that include the establishment of a door to door transport chain from the supplier to the final consumer. In this context, containers play a significant role for the transfer of goods and this lays behind their rapid increase worldwide over the last decades. This is due to the several advantages they

show in terms of handling time and cost, but mostly because they are suitable for every mode of transport or combination of modes and can offer door to door services. More specifically, containerization offers:

- Reduction of the transit time and delays during loading/unloading since goods are not handled separately but as an entity in the container
- Minimal loss and damage and improved security since goods are sealed in the containers
- Lower cost for insurance since there is a high level of security
- Simplification of the pricing procedures since the measure used is not cargo tones but total TEU's
- Minimal packaging cost
- Simplification of customs processes and procedures since clearance occurs for the containers and not all carried goods separately
- Decentralization of facilities for loading, unloading and packaging
- Minimization of congestion
- Suitability for all modes of transport (sea, road, rail) and intermodal transport
- Capability of offering door to door services to the customer
- Reliability in the delivery dates
- Customer satisfaction due to prompt, accurate, door to door delivery

These are the reasons behind the revolution of containers in Greece too, with the port of Piraeus playing a significant role in the national and international transport chain. During the last years the port of Piraeus has shown an increasing container traffic that reached 950.000 TEU's in 1999 (Table 1).

Table 1: Container Traffic in the Port of Piraeus (1994-98)

| | 1994 | 1995 | 1996 | 1997 | 1998 |
|----------------|----------------|----------------|----------------|----------------|----------------|
| Full | 384.908 | 455.171 | 422.176 | 503.169 | 714.108 |
| Imports | 200.511 | 219.248 | 223.569 | 242.461 | 260.918 |
| Exports | 83.870 | 89.521 | 88.193 | 90.519 | 87.048 |
| Transshipments | 100.527 | 146.402 | 110.414 | 170.189 | 366.142 |
| Empty | 131.761 | 144.966 | 153.080 | 180.800 | 218.988 |
| Total | 516.669 | 600.137 | 575.256 | 683.969 | 933.096 |

Source: Piraeus Port Authority

Even though, containers are widely used for the transport of general cargo in the Greek market, this is not the case with the provision of Greek islands. Due to several factors such as high port infrastructure, investment costs etc. the Greek insular market is supplied with goods mainly through the passenger fleet and secondly by a small cargo vessels. As already mentioned, in the first case the transportation of goods is conducted by road carriers (trucks), that perform a sort of a Ro-Ro transport and in the second case there are small cargo vessels that carry mostly commodities.

Is it possible that a new system based on containers will improve the current situation regarding the provision of the islands? A number of different arguments seems to justify the above mentioned thought.

3. Characteristics of the Greek insular market

Greece is situated in the southeast edge of the European continent in the Balkan peninsula in the east Mediterranean Sea. Due to its geographic location Greece shows a coastal formation of 14,854km (with 750 ports and anchorages) and an insular cluster of more than 3,500 islands in the Aegean and Ionian Sea. Insular Greece consists of 19% of the Greek land and around 200 small and bigger islands are inhabited composing the 14% of Greek's population¹.

The main employment sectors in the Greek islands are the agricultural sector, the maritime sector and tourism. Over the last years there has been a rapid increase in the third sector employment and especially in the tourism due to the tourist boom of the islands especially in the summer time season.

On the other hand, Greek islands share some special characteristics that are essential to take into consideration while developing a new transport system. The most important of them are the following:

- a. Geographic discontinuity
- b. Spreading and isolation
- c. Small hinterland
- d. Small and remote market

All the above prove that there is a market seeking regular, frequent and cost effective provisioning. Before proceeding to some thoughts on this subject it is essential to see the current transportation system.

4. The current structure of the Greek Coastal Shipping

Greek islands are mainly served by the existing passenger coastal fleet through trucks form the mainland ports. The port of Piraeus is used for the provisioning of Cyclades, Dodecanese, Crete and Argosaronikos, the port of Thessaloniki for the north Aegean and the port of Patras for the Ionian islands. The current Ro-Ro system includes the carriage of goods and commodities from the supplier to the port and from there with the passenger ships to the customer in the islands and vice versa and is mainly conducted by road carriers (trucks). This system includes the following possible alternatives:

- The truck enters the vessel and travels to the point of destination
- Only the body travels and the there is a tractor in the destination to carry it (especially in big islands e.g Crete)
- More than one bodies travel in the vessel with one tractor

Within this framework the Greek maritime coastal system mainly serves 70 islands of the Aegean and Ionian Sea and 138 ports-nodes, from which 96 are in the islands and the others in the mainland. It is structured in 31 main routes, that serve groups of neighboring islands. By observing Table 2 as well as Figure 1, it is understood that

¹ Sambracos E. 2nd Conference in Transport Economics 'Coastal shipping and Air transport: "Competition and Complementarily". Piraeus 5 November 1996.

the current structure is radial with most of the routes beginning and ending at the port of Piraeus while there is a small connection between islands. The main traffic is between the ports of Piraeus with the islands of the Aegean Sea and Patras with the Ionian Sea. The port of Piraeus is mostly burdened with the movement of trucks than any other port and more specifically the routes Piraeus - Crete and Piraeus - Dodekanisa show the higher movement trucks and the above mentioned destinations show the higher demand for cargo (due to their big hinterland).

Table 2: Number of Trucks that were transported via the Coastal Passenger Shipping for the year 1997

| Route | No | Route | No |
|---------------------------------------|---------|-----------------------------------|--------|
| Piraeus - Crete | 136.129 | Piraeus - East. Cyclades | 38.115 |
| Piraeus - Syros-Paros -Ikaria - Samos | 18.369 | Piraeus - Chios - Mitilini | 42.941 |
| Piraeus - Argosaronikos | 41.398 | Piraeus - Syros - Tinos - Mykonos | 10.336 |
| Piraeus-Peloponisos - Crete | 4.082 | Volos - North Sporades | 24.317 |
| Piraeus-Cyclades-Dodekanisa-Crete | 5.619 | Rafina- Evoia | 6.377 |
| Piraeus - Dodekanisa | 58.527 | Rafina-Lavrio-Syros-Tinos | 20.592 |
| Piraeus - West Cyclades | 12.558 | Patra- Sami- Ithaki | 7.667 |

Source: Hellenic National Statistics Services, Statistical Tables of Greece

Furthermore, the coastal fleet occupies vessels of various types with different characteristics in terms of capacity and speed. The different types of vessels are shown in Table 3.

Table 3: Type of Vessels of the Greek Coastal Shipping

| | |
|----------------------------|-----|
| Passenger Ferries(>100grt) | 501 |
| Passenger/ro-ro cargo | 318 |
| Passenger-Catamaran | 7 |
| Passengers | 143 |
| Liners | 4 |
| Cargo Vessels | 271 |

Source: Hellenic National Statistics Services, Statistical Tables of Greece

Especially, the 271 cargo vessels consist of 70-80 bulk carriers, 60 tankers, 25-30 liquid carriers and 10 pallets vessels with a total tonnage of 92,180 grt. The vessel's characteristics are

- 60-70m length,
- 9,5-11,5 width
- 3,8-4,5 draught and
- 1000-1600tones tonnage

Bulk Carriers usually carry inert materials and some of them carry their own cranes for loading and unloading. They have two decks and it is possible to be used also for the carriage of containers. The majority of them (90-95%) are old vessels, dated back in the seventies. The Greek coastal shipowners have focused their attention in the transportation of bulk cargo. The vessels do not operate in the standard naval routes where the merchant marine ships do but are being chartered periodically.

The main cargoes that are moving by tramp vessels towards the islands are grains, constructing materials, industrial goods, water, fruits. In the reverse movement towards the mainland, the main cargoes that are carried are minerals, wine and olives. These kind of cargoes are transported in bulk, palettes or bags.

Thus the main categories of goods carried to islands are presented in Table 4. As observed from this table the three main categories of goods are fuels, raw materials, and industrialized goods. Also there is a significant need for general cargo as well as foodstuff and live stock.

Table 4: Coastal freight transport 1992-1995

| Year | General Cargo | Special Cargo | Total | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|---------------|---------------|------------|---------|-----------|-----------|------------|--------|---------|-----------|-------|-------|--------|
| 1992 | 1.971.705 | 18.397.634 | 20.369.339 | 624.102 | 745.149 | 4.723.392 | 9.339.722 | 5.820 | 148.508 | 2.801.158 | 1.568 | 2.944 | 5.271 |
| 1993 | 2.131.031 | 18.659.224 | 20.790.255 | 620.719 | 780.253 | 4.215.605 | 10.074.133 | 5.289 | 179.996 | 2.762.570 | 5.142 | 8.007 | 7.510 |
| 1994 | 1.942.609 | 16.618.345 | 18.560.954 | 867.230 | 819.021 | 4.343.067 | 7.680.241 | 63.982 | 581.433 | 2.249.986 | 5.011 | 1.002 | 7.372 |
| 1995 | 2.178.852 | 19.788.230 | 21.967.082 | 673.505 | 1.244.020 | 4.623.694 | 8.865.226 | 13.250 | 439.332 | 2.898.671 | 1.703 | 1.847 | 26.982 |

*in metric tones

Source: Statistical Tables of Greek Merchant Marine

Codification of carried goods:

- | | |
|---|--------------------------------------|
| 0. Foodstuffs and live stock | 5. Chemical products |
| 1. Drinks and tobacco | 6. Industrialized goods |
| 2. Raw materials not eatable (fuels not included) | 7. Machinery and transport materials |
| 3. Fuels, lubricants | 8. Industrial goods |
| 4. Olive and animal or vegetable fats | 9. Other |

5. Exploring weaknesses of the Greek Coastal Shipping system

The current transport chain that was described before shows several drawbacks and increases the total cost of the system. More specifically, the trucking companies that are responsible for the carriage of goods to the islands via passenger ships face numerous costs .

Cost for the underutilized capital (truck, carried goods, personnel) that stays in the vessels unused. For the Greek market we note that a truck costs about 100.000US\$. the monthly salary of a driver is about 1000-1200US\$ and the average travel time is about 15h. This cost increases also due to the delays that the system causes since embarkation and disembarkation on the passenger vessels can sometimes be time consuming and there are no different ramps and hatches for private vehicles and public vehicles (trucks). Moreover during peak seasons, the intense movement of passengers towards the islands from Greece and abroad exhausts the capacity of the

ships. Thus, in this period, priority is given to the passengers and their private vehicles and not to trucks causing delays or even postponements.

For the transport sector there is not only the cost of transportation that needs to be estimated but also the connected cost that is the cost for the return of the truck. Should there be cargo for the return of the truck to the mainland then this cost can be eliminated since there is freight. On the other hand though if there is no cargo then the truck will travel back empty and that means extra costs.

The private cost that transport companies face increases the freight and therefore the final price of the goods in the market affecting negatively the final consumers in the islands. This means high social cost for the insular market with prices higher than in the mainland.

The structure of the system is such, that the majority of the islands are served by the port of Piraeus for both the passengers mobility and the goods transport. Consequently, the port of Piraeus faces congestion problems caused by private cars and trucks. Especially, in the peak seasons and peak hours there is a congestion problem in and around the port.

The radial network with Piraeus as the most important node allows for the frequent service of big islands but the smaller and remote ones, that have less frequent service by ferryboats are not regularly supplied with goods.

We should also consider the fact that trucks cause problems to the islands themselves since they highly contribute to the level of pollution and congestion.

Apart from the Coastal fleet that both serve for the passenger and cargo carriage, there is also a fleet of cargo vessels that carry mostly bulk commodities. The main problem with this fleet is that it is old and will soon need to be replaced.

6. Port infrastructure and efficiency

The Greek islands' ports serving passengers and cargo transportation face a series of infrastructure and organization problems, such as:

- Poorly organized container storage
- Lack of space for container inspection at the port gates
- Lack of Port maintenance of container handling equipment
- Lack of Intermodal terminals
- Few berths
- Lack of maintenance and repair infrastructure
- Bureaucratic formalities
- High port dues and charges
- Working hours of port personnel. The absence of essential port services during evening, weekend and mid-day hours in many ports has been identified as an important reason of delay.

All the above have negative implications in the development of a conventional container system in the islands and eliminate all possible advantages that derive from

the use of containers and the related technology. Moreover, the Greek islands in their majority have a tourist character that comes in contradiction with the development of such infrastructure.

7. Towards a reengineering of the system

A possible reengineering of the current transport system should deal with two important issues. First, the way cargo movement is conducted by introducing new technologies such as containers and second the redesign of the structure and routes so as to relieve the port of Piraeus and improve the provisioning of the islands.

The restructure of the supply system of the Greek islands through containers shows advantages only in the case of big islands that can develop the necessary infrastructure and have high demand for goods. Such cargo flow towards the islands also complies with the new trend of globalization in trade and transportation. In this system the port of Piraeus is and will continue to serve as a transshipment center for containers that come from abroad and then are transshipped to big islands with feeder-vessels.

The development and use of small containers could be a rational solution for the transportation of goods to insular Greek especially in the small islands. The use of small containers under the precondition of a standardized dimension could give an additional possibility for the development of a system in a European scale and not only. Goods will be able to move to and from islands directly from foreign countries without the disadvantage of transshipment in the port of Piraeus. Thus important economies could be achieved due to the limited use of trucks (release of 'dead' capital) and the use of small container to substitute the trucks. Also, the capacity issue will be solved since small containers can serve the islands markets more efficiently than the existing standard ones.

Hence, the dimensional problem can be settled since small containers can be easily carried by smaller vessels that can moor in the islands given the island ports' dimensions. They can also be loaded on passenger vessels easily and travel alone without the tractor of the truck and unloaded in the islands without the use of special cranes in the ports (figure 2). In the case of liner ships carrying small containers there is a need for special handling equipment in the vessel (e.g. forklifts). Therefore there is no need for additional infrastructure in the islands since the small containers can be easily moved by medium sized trucks within the islands hinterland. Thus, small containers can stay in the islands, filled for the opposite destination and return to their origin without underutilizing capital or personnel. The system also complies with the tourist character of the islands (small passenger ports, narrow alleys) and the small containers can be easily used for a door to door transport.

The new redesigned transport system will be completed with the scheduling of the liner cargo vessels, in order to recognize the nodes other than Piraeus that can serve as transshipment centers. These nodes will be a function of tonnage, distance and total cost. This is also a subject of port infrastructure.

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