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FEASIBILITY OF CROSS-BORDER MARITIME SERVICE BETWEEN KOPER AND TRIESTE

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Abstract

Maritime traffic usually involves the transport of large quantities of cargo over long distances. Under such circumstances, maritime transport achieves the highest efficiency. Sometimes, however, it is indispensable or simply useful for shorter distances and for the carriage of passengers.

In some cities, passenger transport by ship is an integral part of public transport. In fact, some 420 million passengers use regular maritime services in the EU; most of these journeys are made within territorial waters.

In this paper, the authors analyze the possibility of introducing a public maritime transport service between two neighboring cities located in two different EU Member States, namely Koper in Slovenia and Trieste in Italy. Although both cities are located in the EU, this is considered an international voyage and as such is subject to strict regulations imposed by International Maritime Organization, which consequently increases capital, operational and travel costs.

1. INTRODUCTION

Transport contributes to European competitiveness and to economic, social and territorial cohesion. Well-developed cross-border transport links are essential for regional cooperation and competitiveness and for promoting the development of small businesses in border areas.

The European Union (EU) wants to improve the quality, safety and environmental performance of transport. One of the ways in which it intends to achieve this is by introducing more sustainable forms of transport for goods and people, for example maritime transport.

Passenger transport by sea in the EU decreased between 2008 and 2014 and then increased steadily and intensively until 2019, when almost 420 million passengers boarded ships [1]. As maritime passenger transport takes place mainly within the territorial waters of each country (63%) and to a lesser extent between EU Member States, virtually every passenger in the EU is statistically recorded twice, firstly when embarking and secondly when disembarking.

This paper presents the demand and feasibility analysis of a cross-border maritime link between Slovenia and Italy, more specifically between the cities of Koper and Trieste. The paper has several objectives: (a) an analysis of the existing network and organization of public passenger transport in both areas, including a review of studies already carried out on cross-border public transport links between Italy and Slovenia, (b) an analysis of demand of the local population for the cross-border maritime link, (c) the selection of a suitable vessel and determination of sea route in accordance to navigation rules, and (d) the estimation of time requirement and costs of indicated sea connection.

2. THE SNAPSHOT OF PUBLIC TRANSPORT IN THE REGION

Slovenia and Italy are two very different countries that share the border and the shores of the North Adriatic.

Slovenia is a small country with a short coastline of only 46 kilometers. Although there have been attempts to connect coastal towns to the sea line, these attempts have mostly not been very successful. Nevertheless, the Interreg Crossmoby project established a free shipping service in Slovenian territorial waters in the summer of 2020. In the summer of 2021 the same service was offered for a symbolic payment to skip the abuses from the year before. Theoretically, there is also a sea Uber in Slovenia called Wayv [2].

With a population of about 27,000, Koper is the largest city on the Slovenian coast. It is a port city whose cargo port is one of the most important in Northern Adriatic; in passenger traffic, however, it plays a minor role.

Koper has a well-organized and subsidized public transport system and is well connected to the other coastal cities. However, connections to the villages in the hinterland, where another 25,000 people live, are rather poor, so that private transport often has to be used even for short distances.

There are about 4,000 parking spaces in Koper, most of which can be used for a fee of about EUR 1 per hour (summary from [3]).

On the other hand, Italy is one of the EU countries with the highest number of ferry passengers in Europe: more than 80 million in 2019. The ferries, which are designed either for passengers only or also for vehicles, operate daily throughout the country. Passenger-only ferries have been operating near Slovenia, from Trieste to Muggia, for about 20 years. Although there is a dense and frequent network of bus connections on this route [4], there are also 10 boat connections in each direction per day on weekdays and 6 on weekends [5]. The boats that provide this service have a capacity of 200 to 300 passengers and the trip takes about half an hour, less than by bus, while the price of a single ticket is twice as much as by bus ([4], [5]). However, it should be noted that Trieste is a large city with more than 200,000 inhabitants, which creates a great demand for public transport. About 10% of the population of Trieste spends a lot of time on public transport every day, on average 49 minutes, half of them even more than two hours. About 26% of the population of Trieste uses public transport for trips longer than 12 km in one direction. Almost half of the users have to change the means of transport at least once in one direction, while 15% of them have to change at least twice (summary from [6]).

The two countries, more precisely the two cities of Koper and Trieste, are currently not connected by sea, at least not in the form of public transport. Instead, they are connected by 9 regular bus services per day; the number of busses decreases on weekends.. A single ticket costs EUR 3.30 and the journey takes between 45 and 65 minutes [7]. In the summer season there are 2 Flixbus connections per day, in other periods less. These are faster, but also much more expensive than the regular busses [8].

It is estimated that about 5,000 migrants travel from the Slovenian coast to Trieste every day [9]. Italy is traditionally a shopping destination for Slovenians. Trieste provides work for some Slovenian workers, either as formal regulated employment or as unregistered help in households. Finally, University of Trieste is also attractive to students from the region, who prefer Trieste to Ljubljana or Maribor. There are more than 16,000 full-time equivalent students at the University, of which about 9% are foreigners [10]. Moreover, the two cities are also tourist destinations and both cruise passengers and guests from the countryside might want to visit the neighboring country.

3. THE ANALYSIS OF PUBLIC OPINION

In order to determine the attitude of the locals towards the possible introduction of a maritime link between Koper and Trieste, we distributed the survey information to local citizens and Italian associations on the Slovenian coast.

The questionnaire, which consisted of 9 topic-specific questions and 2 demographic questions, was posted on the web platform ensuring anonymity of respondents and was open for 7 weeks in July and August 2021.

There were 398 unique clicks on the survey link, of which 128 (32%) expressed interest in the topic. The main conclusion from the survey is that the demand for a maritime connection between Koper and Trieste is low; in fact, currently only 4% of respondents use public transport to travel to Trieste.

The majority of respondents travel to Trieste occasionally (43% rarely and 26% at least once a month) and 30% of respondents travel to Trieste several times a week (including weekends). Although the majority of respondents travel to Trieste alone (probably for professional reasons), they would mainly use the boat to travel in pairs or even in groups (82%). Moreover, 57% believe that they would use the service more intensively during the summer season. This suggests that respondents would likely use the boat service for occasional leisure trips to Trieste, rather than daily. In fact, only 9% indicated that they would use the ship to travel to work and 3% to reach the university; they would travel less during summer time.

The majority of respondents, 58%, would be willing to pay EUR 5 for a one-way ticket and almost a quarter of respondents, 24%, would be interested in buying a package of ten tickets at a price of EUR 45. Some respondents would be willing to pay even more.

Half of the respondents would accept a 60-minute journey (52%), but the other half would expect a shorter journey, mainly between 20 and 30 minutes or at least not longer than by bus.

4. THE SEA ROUTE BETWEEN KOPER AND TRIESTE

The shortest sea distance between the cities of Koper and Trieste is only 6.5 miles (12 km) [11]. However, if we take into account the navigation rules, especially Traffic Separation Scheme, this distance increases to 11 and 16 miles, respectively, as can be seen in Figure 1.

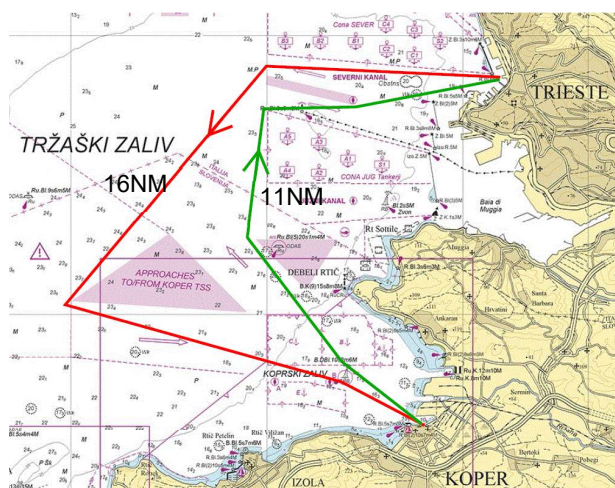


Figure 1. Navigation routes from Koper to Trieste and vice versa

In addition, for safety reasons, ships must navigate at a maximum speed of 6 knots when arriving at the port aquatorium. In Koper this applies to a distance of 2 miles from the pier, and a similar distance is used in Trieste. This means that it takes 20 minutes to cover this distance, regardless of the maximum or optimum cruising speed of the vessel.

The following table shows the time required to navigate from Koper to Trieste and back at different speeds.

Table 1. Time requirements to cover the sea distance from Koper to Trieste and back at different cruising speeds while taking into account mandatory slow speeding

Cruising speed [knots]	Koper-Trieste [min]	Trieste Koper [min]
14	59	80
16	54	73
18	50	67
20	47	62
22	45	58

5. THE COST CALCULATION FOR A SELECTED SHIP

A voyage between two ports not located in the same Member State or a voyage from a port in a Member State to a port outside the EU and vice versa is considered an international voyage. Although the route from Koper to Trieste is short, it is an international voyage. This means that the ship and her crew must comply with the requirements of International Maritime Organization (IMO) for passenger ships on international voyages. The requirements of SOLAS (International Convention for the Safety of Life at Sea), MARPOL (International Convention for the Prevention of Pollution from Ships), STCW (International Convention on Standards of Training, Certification and Watchkeeping for Seafarers), LL (International Convention on Load Lines) and some other conventions must be taken into account.. These requirements mainly concern construction materials (ships must be built of steel or equivalent in terms of fire resistance), safety equipment (number of lifeboats, life rafts and safety vests, and communication equipment) and a minimum number of adequately trained crew members. Consequently, the costs increase.

Like other tangible assets, passenger ships lose value over time, but their lifespan can be very long; ferries in operation for 40 or more years are not uncommon. Their lifespan depends on the size of the vessel, the shape of the hull, actual use, maintenance regime, etc.

We have done a cost calculation on a used vessel that meets IMO requirements for international voyages. It is an aluminum vessel built in 1999 with a length of about 20.2 meters and a capacity of 145 passengers. The vessel is powered by two 602 kW engines capable of reaching a speed of 18 knots and costs around EUR 850,000 [12]. The initial price increases if the ship is debt financed.

Ships can only be used on international voyages if they are insured. The insurance of passenger ships is special because, in addition to the ship (hull and machinery) and its equipment and fittings, the crew and passengers must also be insured under general liability insurance. The factors that affect the insurance premium can be the

value of the vessel, the length of the vessel, the age and category of the vessel, the type and size of machinery, the area of operation, previous claims made by the owner, etc. Together with the costs for maintenance and certification, these costs would amount to at least 60 to 65,000 EUR per year.

A vessel of such capacity would require at least 5 crew members. In Slovenia, their total monthly remuneration would be around EUR 20,000 gross per month or around EUR 250,000 per year.

The cost of consumables, including lubricants, hygiene products, crew supplies, and ticketing can be estimated at around 15 to 20,000 EUR per year.

All of the above costs are considered fixed costs. The variable costs relate to the voyage itself and include port charges and bunker costs. Bunker costs depend on consumption and fuel price, which can be very volatile. The higher the speed, the higher the consumption, but the relationship is not linear. A ton of bunker fuel currently costs around EUR 520 at North Adriatic. The ship from our example consumes about 300 liters of fuel per hour at a cruising speed of 18 knots and about 50 liters per hour at 6 knots. A round trip per day throughout the year would cost about EUR 73,000 in fuel (calculated at the current bunker price). Harbor dues usually consist of two elements: a monthly rate depending on the size of the vessel and the location in the port (EUR 7 to 14 per meter per month in Koper), and a price per passenger embarked or disembarked (EUR 0.40 per passenger in Koper).

6. DISCUSSION

If we look at investment from the individual's point of view, it is the payback period (PP) that influences a person's investment decision. In the simplest calculation, we can neglect the changing value of money over time and use a simple equation:

$$PP = \frac{\text{initial investment}}{\text{annual cash flow}} \quad (1)$$

We can turn the equation around and determine how many passengers would be needed to recoup the investment, knowing that the majority would be willing to pay EUR 5 for a one-way trip, and assuming that the number of passengers is constant over the years and that the ship makes 4 round trips per day

A rather conservative approach to cost estimation results in a total cost of EUR 625,000 per year, which is independent of the number of passengers. We have to add the cost of EUR 0.40 for each passenger using the service. The maximum number of passengers per day would be 580 in each direction.

Table 2. The costs calculation for sea line Koper-Trieste-Koper

PP	TC	TR	TR-TC	Pax (year)	Pax (day)	Utilisation
5	694,130	864,130	170.000	172.826	473	41%
10	686,739	771,739	85.000	154.348	423	36%
15	684,275	740,942	56.667	148.188	406	35%
20	683,043	725,543	42.500	145.109	398	34%

Note: PP-payback period, TC – total costs, TR – total revenues

In a broader aspect, the sea link could help to decrease road traffic and hence road emissions and improve road safety. If local authorities want that, direct (ticket prices) or indirect (e.g. parking charges for ship passengers) subsidies could be used. However, it should not be forgotten that ships also produce emissions (e.g. [13]) and cause severe health problems (e.g. [14]).

7. CONCLUSION

In some European cities (and not only there) ferries are connected to land public transport and serve a number of purposes, notably offering passengers choice and relieving pressure on land links. Ferries also connect more distant places, especially in the Mediterranean and Baltic Sea; but usually where the land connection is impossible or much longer than the sea connection. This is not the case with the sea connection Koper-Trieste. The distance is very short and the navigation rules would make it very time consuming. Also, the ship passengers have to leave home, get to the terminal or embarkation point, board the ship, travel, disembark and reach their destination. This can be very time-consuming and inconvenient, especially for short-distance routes. In fact, the demand survey for a sea line Koper-Triste has shown low interest, and although the costings show that the load factor to recover the costs would not need to be very high, it is very likely that it could not be achieved unless potential passengers are offered something more.

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