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Urban Transport - Synergies between City and the Port - the Example of the City of Koper

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ABSTRACT

Koper is located in Slovenia near the Italian border and is the fifth largest city in Slovenia with 53,000 inhabitants. The history of the town is interesting because it first flourished during the Venetian Republic, when it became an important administrative and cultural centre of Istria. After the Second World War, the city underwent a different development as a harbour was built next to the old town. Today, Koper is a town that connects the old town centre with the newer surrounding settlements and is closely linked to the port of Luka Koper. The municipality covers an area of 303 km^2, 48% of which is protected by Natura. Since 2017, the municipality of Koper has been implementing an integrated transport strategy aimed at ensuring sustainable and environmentally friendly mobility for its citizens. To ensure accessibility and a better quality of life, pedestrians, cyclists and public transport are promoted in particular. Residents of Koper who do not live in the old town still predominantly use private cars to get to work, school, and university. Koper is an old city that has existed since the time of the Roman Republic and has many monuments. To reduce the number of cars, the city centre has been closed to traffic, and residents of Koper's old town can use parking garages or open parking lots for a small fee. For everyone else, parking lots with P+R facilities have been set up, but there is great dissatisfaction among the population. Another problem is the increasing freight traffic coming in and out of the port of Koper. The port and the city live in harmony, but the problem of increasing freight traffic at critical times and on critical days is a big problem. In this paper we will outline the measures that should be taken in the area of public passenger transport and freight transport to ensure that the strategy is implemented.

1. Introduction

The number of people living in cities has increased rapidly in recent decades. Today, it is estimated that more than 55% of people live in cities, and the trend is increasing [1]. As a result, cities are facing the problem of urbanisation, which poses major infrastructural challenges in terms of establishing modern transportation systems in cities. The growing number of people living in cities is a major challenge for transportation planners. As the urban population grows, so do the daily trips, a large part of which are still made by car, which has a negative impact on the environment. Today, there are many alternatives to fossil fuels, but gasoline cars still predominate because they are the most affordable. As a result, car traffic is still one of the main sources of greenhouse gas and noise pollution.

During peak periods, additional congestion occurs, further increasing pollution and compromising the safety of road users. Excessive use of private vehicles and insufficient use of sustainable forms of mobility are thus becoming a problem that cities are facing and trying to solve in different ways. One way to improve mobility and ensure accessibility for all is to develop a modern urban transport strategy that sets out the mobility goals that the city wants to achieve. Sustainable transportation is one that encourages the use of sustainable forms of mobility such as walking and bicycling, but also requires well-organised and efficient public transportation. In this way, the use of private vehicles can be reduced, urban road safety can be improved, and the goals set out in the strategy can be achieved.

To achieve all this, it is essential to involve the city's residents in the preparation of such a strategy from the very beginning. Involving those interested groups can help decision-makers in the elaboration of sustainable mobility strategies, since they know best the problems and the real needs, and it can also help to reach more quickly final solutions acceptable to all, or at least to most, of the interested parties. This is even more important in the old cities that are not architecturally adapted to the transport needs. In this paper, we present the challenges of implementing a transport strategy in the old city of Koper, which is a historic city and at the same time a city with a modern cargo port, which brings additional challenges for transport planning.

2. Urban traffic problems

The rapid growth of cities has exceeded the planned framework for the development of urban transport, and the number of motor vehicles in urban transport has increased extraordinarily rapidly. The rapid increase in motorization initially brought many benefits, especially in terms of increased mobility for people, but at the same time had extremely negative impacts on the environment, as traffic negatively affected air quality in cities through emissions and noise. Air pollution is one of the biggest problems facing cities, affecting the quality of life and the health of the population. The increase in urban traffic has also led to an increase in the number of traffic accidents and fatalities on urban roads. The number of vehicles on the road, speed, the condition of infrastructure and vehicles, and driver behaviour are all related to the occurrence of accidents [2]. The space that cities must provide for parking is also a major problem. For these reasons, a key objective of modern cities is to introduce measures to reduce the use of private vehicles and encourage the population to use more sustainable urban mobility solutions.

2.1. Active mobility

Active mobility is a new trend in urban transportation planning and is therefore considered in all strategies. Active mobility is mainly defined as walking and cycling, as the promotion of these two elements brings a number of benefits to individuals by promoting a healthy lifestyle. At the same time, the implementation of such mobility can significantly reduce the share of car use in the city [3]. Although everyone knows that active mobility is better, there are still problems with its implementation, mainly because of inadequate infrastructure for pedestrians and cyclists [4].

According to Gonzalo-Orden, et al. [5] the cycling network should be connected to key points and attractions in the city that are easily accessible on foot and from the rest of the city. Building the right infrastructure therefore promotes active mobility as well as micromobility, especially through electric scooters, which reduces car traffic, improves road safety, and reduces negative environmental impacts. This is of great importance to the people who live there. Modern urban transport systems are now integrated with information and communication technology, which helps to further reduce pollution and congestion, and increases the safety and efficiency of the transport system without the need to build new transport routes. The idea, then, is to make better use of existing resources. Since not everyone can walk or ride a bicycle, efficient public transportation must also be provided.

2.2. Public transport

One of the solutions to reduce the number of private cars in cities lies therefore in the establishment of efficient public passenger transport [6]. Compared to private cars, public transport is much more economical, energy efficient, has lower emissions and requires little or no intervention in the environment. Bus transport is the most widespread form of public transport in cities, as it is the easiest to introduce and adapt, and is the most economical mode of transport on routes with fewer passengers. According to Spirin, et al. [7] the quality of public transport can be judged by how access to public transport is ensured for all categories of passengers, the extent to which transport safety has been improved, the standardisation of public transport and the improvement of passengers' needs and expectations, the efficiency of the public transport network, whether it allows the integration of different modes of transport (bicycle and public transport) and how it reduces waiting times for transport.

3. Challenges in the preparation and implementation of a modern transport strategy in the old town of Koper

Koper is an ancient city on the Gulf of Trieste, in the northernmost part of the Adriatic Sea. Its origins are connected with the Republic of Venice, and for many years Koper was an island. Later it was dredged and transformed from an island into a peninsula. All these basic features of the city have for a long time also determined its transport connections with the hinterland. As an island, it was connected to the rest of the island only by a road.

Major changes occurred after 1957, when a port began to develop next to the old town centre. Usually ports are built where there is the best connection to the hinterland, but this was not the case in Koper. Koper was politically chosen as a port because, according to the decision of the Osimo Agreement, the state border between the then Yugoslavia and Italy was located here. Since the port of Trieste remained in Italy, it was decided to build a new modern port also in Yugoslavia. The development of the port also shaped the image of the city of Koper and its transport links. Today, Luka Koper d.d. is a modern port that handled 23.2 million tonnes of goods in 2022.

According to [8], 46% of cargo to and from the port is transported by road, with 399,291 trucks entering the port last year, or almost 1,100 trucks per day. As the city and the port are closely connected, this number of trucks poses a major problem for traffic management and ensuring sustainable mobility in the city.

3.1. Integrated Transport Strategy of the Municipality of Koper

The Integrated Transport Strategy of the Municipality of Koper is a 2017 document, which is the result of an intensive stakeholder engagement process that took place before and during the preparation of the document. During the preparation, all the specifics of the locality and the wishes of the residents were analysed and finally five strategic planning pillars were established, starting with walking, followed by cycling, followed by the use of public transport, optimization of road transport and ending with integrated transport planning [9]. The activities of each pillar carried out for the old town are already showing results. The first pillar of planning is perhaps the most difficult to realise, because the habits of the inhabitants are often different than planned. In Koper, the city centre was closed to car traffic, which initially caused great dissatisfaction among residents who were used to parking their cars in front of the house entrance.

With the construction of a large underground parking garage, where residents of the city centre can buy monthly passes at a symbolic price, all cars were banned from the city centre. The second pillar follows on from the first, as the ban on car traffic makes room for the creation of bicycle lanes. Today there are about 25 km of bicycle paths in the municipality of Koper, and cycling is very popular among the population [9]. This has made Koper an efficient 15-minute city, which explained by Staricco [10] means that most daily needs and services easily accessible within 15 minutes on foot or by bicycle from any point in the city.

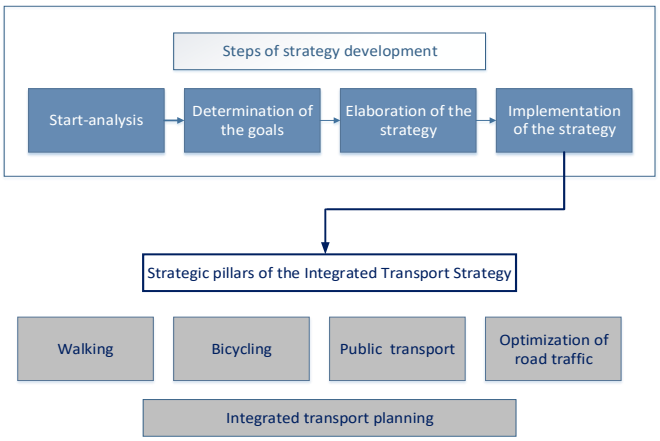

Figure 1. Link between the elaboration of the strategy and the strategic pillars
Source: Adopted from [9]

The third pillar, which is about the establishment of efficient public transport, concerns only bus transport in the municipality of Koper. Electric buses, so-called mini couriers, have been introduced for the Old Town, providing free transportation in the Old Town, especially for elderly and disabled people who are not able to cover these distances on foot. [11]. Modern buses with different capacity connect the old town with the outskirts of the city.

3.2. Challenges

In order to achieve the vision and meet the goals set in the Integrated Transportation Strategy, activities to reduce motorised traffic in Old Town must continue. This requires meeting the accessibility needs and expectations of residents, both those who live in Old Town and those who commute there daily for work, study, or other commitments. For this reason, as part of the improvement of stationary traffic, several P+R parking lots have been established, where it is also possible to purchase a ticket for the city's passenger transport system in exchange for a parking fee.

This option is still underused, as residents are accustomed to driving to any office, shop or school. Two modern parking garages owned by the Municipality of Koper are now available to visitors and residents of Koper. The first is located in the city centre, under Belvedere Square, and has 466 parking spaces, while the second, Sun Parking House, with a capacity of 464 vehicles, is located at the entrance to the city, near the main entrance to the Port of Koper. In addition to the parking houses, there is a large number of open paid parking spaces, but unfortunately there are always too few of them, so new solutions have to be found in the form of more buses connecting the centre with the suburbs.

At critical times (the beginning and end of the workday) there should be significantly more buses than there are now, and in the meantime there is less need for transportation. Lines should be better covered at these times, and the use of smaller electric buses could ensure that the different parts of the city are connected to the old city. If we want to promote active mobility, we need to make it possible to rent bicycles and electric bikes. Rental stations should be located near parking lots so that those who arrive by car can rent a bike and also in the old town centre, near colleges, offices, and the entrance to the port, which is a major employer of people from the broader area. However, from June 2023 a system of shared electric scooters has been implemented in the old town center. As stated by Horjus, et al. [12] and Soares Machado, et al. [13] promoting intermodal urban transportation modes, including public transport and active mobility, is key to developing sustainable transportation.

The next challenge to be met is the cargo traffic entering the port of Koper. For the smooth operation of the port, it is essential to ensure the throughput of trucks entering and leaving the port. Care must be taken to ensure that not too many trucks block all access routes to Koper, preventing the arrival of buses and private vehicles. Therefore, a regulated access system should be established where only trucks with entry papers for the port of Koper are allowed to enter the city from a remote lorry parking lot or terminal. In this way, traffic can be controlled and, if necessary, stopped before congestion occurs.

4. Relationship between port and the city of Koper

Although ports play an important role in the economic and social development of cities, regions and countries, they are still industrial areas that can sometimes pose a threat to people's safety. The development of port areas in cities requires improvements in urban planning and mobility. The application of new technologies in these areas should not be limited to improving the efficiency of the logistics chain between the port and the hinterland, but should also include efforts to improve the relationship between the port and the city, with particular attention to safety, environment, society and port management.

In recent years, port cities with developed port activities have faced new challenges related to green trends. Cities and ports that have developed hand in hand for decades or even centuries now find themselves on opposite shores when it comes to the development of port activities. The demand for better synergies comes from both sides - the port and the city, who want to ensure better mobility for their citizens and a higher quality of life in the port city.

4.1. Consideration of green development trends

Green development of port cities therefore requires both technological advances in the port and improvements in urban planning and mobility in the port and urban belt. The application of new technologies in ports can reduce noise, air and water pollution, increase the efficiency of logistics chains between the port and the hinterland and redirect freight traffic to more environmentally friendly modes of transport. Efforts to improve port-city relations therefore focus on monitoring environmental impact, certifying energy efficiency, meeting safety requirements and ensuring greater mobility for the population [14]. How this issue is addressed in different countries or port cities usually depends on government support and understanding of the importance of the port to the country or region. However, the following assumptions can be made:

- Cities are designed with infrastructure, planning standards and land use regulations in mind.
- Urban policies and strategies must ensure greater sustainability and resilience in all areas.
- Port cities are complex entities composed of morphological features of many urban fragments that play an important role in mobility.
- Strategies and measures to improve the sustainability of urban areas need to address the issue of green transport.
- The need for different services and infrastructures to and from the port and the city (work, leisure, etc.) should be recognized.
- A new planning concept is needed to ensure urban mobility.

4.2. Port - city synergy - case study of Koper

By promoting elements of synergy manifested in integrated infrastructure planning, economic diversification of activities, urban regeneration of the city and port, joint planning for environmental sustainability and joint co-operative management, ports and port cities can create a dynamic and sustainable environment in which both entities thrive and promote each other's growth and development.
Factors that favour the connection between city and port are geographical proximity, transport infrastructure, logistics and trade as well as urban planning. Looking at the situation in Koper, we can briefly state the following:

Geographical proximity: Koper has a well-integrated port near the city centre, which is easily accessible for both residents and businesses.
Transport infrastructure: A well- developed road and rail network connects the port with the city and beyond, enabling efficient transport of goods. The city and the port are part of the Trans-European Transport Network (TEN-T), which ensures connectivity on a European level.

Logistics and trade: Koper is an important logistics hub offering services such as warehousing, distribution and customs clearance. Various types of goods are handled in the port, including containers, vehicles and bulk goods.

Urban planning: Urban planning in Koper emphasises the integration of port activities with urban development to ensure a symbiotic relationship. The port and the city are looking for joint solutions. One of these solutions is to tackle the problem of road freight transport in the city.

Accordingly, the fourth pillar (road traffic) in Figure 1 is one of the most pressing problems in Koper, as the old town is closely connected to the port and around 1,100 trucks enter and leave the port every day. The main entrance to the port is located right next to the old town, and the truck terminal for trucks waiting to enter the port of Koper was right next to it till the end of 2023 [15]. The new truck terminal was opened at the beginning of this year (January 2024). It is located right next to the new port entrance (see Figure 2).

Figure 2. Truck terminal locations
Source: Adopted from [8]

The new plans also include the construction of a missing junction from the Ljubljana-Koper motorway to the new truck terminal. This will actually shift freight traffic away from the old town centre (Figure 3).

Figure 3. Planned Srmin Inpass
Source: Adopted from [16]

Construction of the new road is scheduled to begin in 2024 and will continue the cooperation between the port and the city, contribute to the further revitalisation of the city and facilitate traffic planning in the city itself, which will then no longer be so congested with trucks.

5. Conclusion

Urban transportation planning faces a number of challenges stemming from the new demands for sustainable mobility, the architectural constraints of old cities, and the desires of residents and commuters. Transportation planning is no longer conceivable without the use of modern technologies, smart solutions and intelligent services. Today, it is the intelligent transportation systems that enable us to provide innovative transportation planning and management services through advanced applications of information technologies. These systems can help us solve mobility problems, increase the efficiency and fluidity of traffic, and improve traffic safety without requiring major interventions in existing infrastructure. Modern cities are striving to make progress in reducing traffic congestion, increasing control and management of emissions, ensuring the mobility of travellers and increasing traffic safety, and increasingly promoting the use of bicycles.
In this article we focus on the old town of Koper and analyse the elaboration of the strategy and its implementation. Here we can see the transition from the planning to the implementation of the mobility of the inhabitants, where all activities are focused on sustainable mobility. At the same time, the Municipality of Koper is working on the implementation of other measures foreseen in the strategy and related to the urban area, such as the planning of bicycle infrastructure, pedestrian paths, sidewalks, the creation of a more efficient P+R system, the promotion of the exchange of electric bikes, etc., all with the aim of moving towards green mobility. However, as the port of Luka Koper has a major impact on the city traffic situation (congestion) and the development of the city, good co-operation between the two institutions is essential. The main goal of both is the development of the port, which translates into the economic growth of the region and the country and the creation of jobs for the surrounding population, while at the same time reducing the negative impact of port activity on the city, as this greatly affects the quality of life in the old town and the wider area.

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