

## INFLUENCE OF ROAD INFRASTRUCTURE ON FUNCTIONING OF POSTAL TRAFFIC IN THE REPUBLIC OF CROATIA

Pero Škorput<sup>1</sup>, Marijan Binički<sup>2</sup>, Davorin Vukadin<sup>3</sup>

<sup>1</sup> Faculty of Transport and Traffic Sciences Zagreb, Croatia

<sup>2</sup> Croatian Post Inc., Croatia

<sup>3</sup> The Vehicle Center of Croatia, Croatia

### Abstract

Croatian road infrastructure development has got crucial importance for regular functioning of postal services in the Republic of Croatia. According to the Law on postal services (Official Gazette No. 88/09) the performance of universal service is of interest for the Republic of Croatia, actually to the users of postal services throughout the country must be provided with a universal postal service under the same conditions and a postal service provider has right to cancel service only in the case of force majeure. In fact there is no motorways, expressways or local road in Croatia that is not used daily for transporting shipments, with some service vehicles of different postal or courier services.

Due to the large representation of road vehicles in the transport of shipments, the centre of the sorting shipments are being built near traffic junctions such as motorways or high-speed roads, airports, railway stations etc. Mailing (dispatching) centre, which for various reasons are in the city centres and often do not have disabled access to major road vehicles (trucks) for loading off shipments and therefore arise additional and unnecessary cost for service providers. Also the daily circulation of a large number of vehicles for delivery to the postal centre generates additional traffic jams and significantly pollutes the environment.

Very important role in the process of determining the schedule (the organization of transport technology - УТР) has a selection of roads, vehicles and capacities that are owned by a service provider or contract carrier. Especially the УТР is manifested in the extraordinary transport of shipments (e.g., order for courier delivery of shipments) in large urban areas in order to keep the delivery deadlines, to save on transport costs and increase safety and protection of workers and shipments in the traffic process.

*Keywords: shipments, environmental protection, sorting centre, road, safety and protection*

### 1 Introduction

Transfer of news or goods (shipments) is as old as the human civilization. The first roads for messenger service were built by Sumer in Mesopotamia in the third and second millennium BC. One of the largest and best organized messenger services in the middle Ages, the Roman "Cursus Publicus. It is an organization for transport of passengers, military, goods and correspondence. Until the fourth century Roman Empire built 76,000 kilometres of main roads that lead to Rome. One of the most significant roads in Croatia's history from that time was Via Dalmatia along coastal area and Via Pannonia along the continental part of Croatia. Today are a large number of roads in Croatia coinciding with the Roman routes. The beginning of the 19th century was marked by intensive construction of roads in all parts of Europe. We have built among others Karolinska, Josefinska and Lujzinska road connecting Karlovac with

Rijeka. These roads belong to the order of the then first-level road known as post roads, and this name was given by the fact that they occurred in a regular postal traffic.

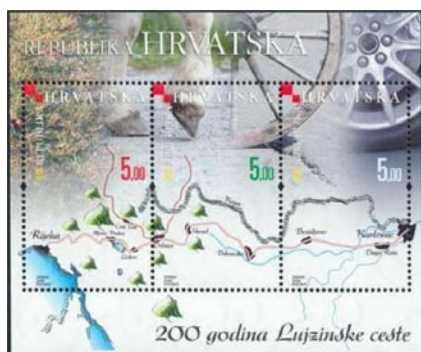


Figure 1 Commemorative stamp: 200 Years of the Louisiana road, 2008.

So in year 1843 the postal car from Rijeka to Zagreb was driven 27 hours. The development of road infrastructure used by the postal service shows the fact that, for example, that in the late 19th and early 20th century in Dugo Selo the shipments were dispatched to the local station buggy, four times a day. With the arrival of the first cars in Zagreb in year 1903 and their use for transport of postal shipments in the year 1913 began modern and fast way to transfer shipments in domestic and international postal traffic.

## 2 Factors of safety and protection of postal shipments in road transport

Safety and security as well as the speed of postal shipments are one of the most significant factors in the competitiveness of postal, courier and other companies dealing with delivery. Often, this is a decisive factor for a number of senders and recipients of postal shipments over the world, whose satisfaction is crucial in terms of increasingly global market competition and in time using different substitutes in the transfer of shipments, but also for the existence of more than five million workers only employed in the postal service of national postal operator. Modern organized postal service, which includes public services (transmission of shipments available to everyone), regularity (so called mail stroke has the time and direction of movement) and reliability is of paramount national importance. Key role in this complex process is the transport of postal shipments in road transport in internal and in international traffic. Mutual dependence of subsystems man (M) - vehicle (V) - roads (R), as the main factors of safety in road transport, postal operators, added to great importance. For traffic safety is of particular importance the area which overlaps all of these subsystems. They are directly related to the safety and protection of the shipments that are transported by different motor vehicles, depending on the type of shipments (small or large shipments) in different types of roads in which transfer part hundredth of drivers.

Universal Postal Union (UPU), a specialized agency of the United Nations (UN), headquartered in Bern, the capital of Switzerland, was founded back in year 1874 and it is the main organization for 191 postal administration from all over the world and an important institution that manages the processes of contemporary post globalization, noted the importance of safety and protection of workers, vehicles, buildings and shipments themselves and twenty years ago established the Postal Security Group (PSG). In addition to established postal security network among its members by linking with relevant international institutions. This Group with their security programs and protection increases competitiveness in the global postal market by applying effective security measures.

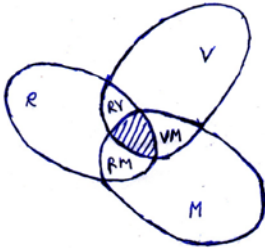


Figure 2 Venn's diagram – effect of subsystem on traffic safety

Problems of security and protection of postal shipments in the current road traffic is only partially addressed in the literature, so there is a need for further professional study in the context of technology, postal services. In accordance with the Strategic Plan of the Ministry of Sea, Transport and Infrastructure of the Republic of Croatia in the period 2010 - 2012, the protection of people lives and goods in transport is a permanent aim and task of the Ministry, and achieved good equipment workers, the organizational units of the Ministry, and other providers of transport services equipment, devices, establishing quality control systems and traffic management, ICT systems and radio contacts, and environmental protection from pollution activity is indivisible from the traffic and activity is conducted simultaneously and permanently.

### 3 Concern about environmental protection

The development of the road traffic is continually growing all around the world as well as in Croatia. Although exhaust emissions generated by road motor vehicles are not the only source which contributes declining air quality, certainly they are one of the major polluters, especially in big cities. One of the very important pollutants is also postal industries. So the UPU members with its 600 thousand buildings and about a million vehicles in 2008 produced 26 million tons of carbon dioxide, which represents 0.07 percent of the total pollution. But, no regardless of such a small share of total pollution, the postal sector is very much advocates for environmental protection. UPU in 2004 founded a Group that deals with environmental protection, which aims to transfer knowledge and experience between member countries and to study how the postal sector can best use the renewed energy and promote the use of alternative vehicles for the delivery of parcels. A good example of active participation in environmental protection has recently been the participation of representatives of UPU-in at the 15th UN Conference on Climate Change held in December 2009 in Copenhagen. The conference is aimed at the reduction of carbon dioxide emissions by 20 percent by 2012. year. Croatia is also committed to the Kyoto protocol on liability in relation to prevent greenhouse gases in the atmosphere. So until year 2012 has to reduce emissions into the atmosphere by five percent compared to the level of 1990. As the starting year not negligible Croatian postal infrastructure consisting of more than twenty postal operators operating on the Croatian market can also make their contribution in reducing carbon dioxide emissions, which ultimately aims to secure future. One of the good educational - informative examples that indicate the importance of the problem of climate change is a commemorative postage stamp issued in the Republic of Croatia released in the block, "Protecting the polar regions and glaciers," was released in March 2009. Certainly, a good example of environmental awareness when it comes to the postal sector and the use of bikes, when it is possible, to deliver postal shipments. Harmful gases decrease released by vehicles to transfer of shipments and reduce energy consumption can be achieved with several measures:

- Better planning of the postal network,
- The use of rail and intermodal transport

- Planning the route,
- Training and supervision of delivery drivers,
- The use of alternative fuel vehicles (hybrid drive, the diesel, electric vehicles)
- Delivery of shipments to narrow the field to perform on foot or by bicycle (the France Post -La Poste), about 100 thousand postmen, on average each day exceed the time that is equivalent to 50 trips around the world and even 28 percent used a bicycle in the postman delivery. Delivery of shipments by bicycle in Croatia is not used to a great extent. Croatian Post and Bicycle Express is one of the few operators in Croatia who use bicycle as a vehicle to deliver shipments.

## 4 Transport organization of postal shipments

The area of road transport is much dispersed and reaches every place connected with some form of road, which allows the movement of road vehicles on wheels. For example, in Croatia, Croatian Post Inc. more than 1145 post offices and several other postal centres, spread across the country, including numerous populated islands, the day on weekdays, at least once, in connection with road vehicles to transport shipments. To that should also be added transport networks which are organized in the delivery post offices (automobile, motorcycle and bicycle delivery of shipments and telegrams), areas that are used for reception and delivery of courier shipments, or in rural areas where is organized mobile post office (in means of transport ), which provides services at a specific time and specific days.

Safety, accuracy and regularity of shipments in transit depend on a well planned timetable. Transport organization of postal shipments is determined by the order of transport postal shipments issued by the postal operator. This establishes lines of international and internal transport of conclusions, the time of departure and arrival of vehicles, number and capacity of motor vehicles, as well as other elements affecting the organization of transport, depending on the level of carriage of postal shipments. Transport of shipments, in a broader sense, includes technological process of shipments, transportation and the advent of shipments. Parts of the shipment, transportation and the advent of mutually conditioned and the technological regulations for conducting, in order to achieve efficiency and continuity of the transfer of shipments from handling the destination post office.

Establishing continuity of transportation of shipments in the system of Croatian Post and the international postal system structure is determined by the transport technology (UTP) in three levels:

- Routes, vehicles and map connection between post offices and postal centre;
- Routes, vehicles and map connection between the postal centre;
- Routes, vehicles and map bonds in international traffic.

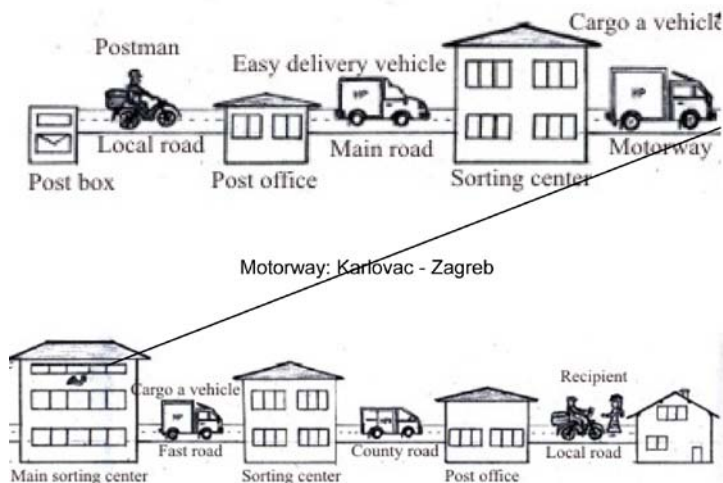
Very often the postal operators to coordinate their ranks with other contract carriers (bus companies, railways, bargees etc.) that accompany the shipment transported on certain routes. Duration phase of technological transfer of shipments can be calculated by the formula:

$$t_w = \frac{L}{V_p} + \frac{t_d}{2}$$

Where is:

- $t_w$  - time during transport from the point of embarkation (pick) to the place of disembarkation
- L - distance from the point of embarkation to the place of disembarkation
- $t_d$  - a waste of time to run for retention
- $V_p$  - traffic speed

If the stage of transport came to change of the transport assets, then this phase must be added time lost on a casual (interface) manipulation and the time that substrate spent in the means of transport other transport networks.



**Figure 3** The process of transportation of shipments using more transport vehicles and different routes. Illustrated by Stipan Tokalic

To facilitate understanding of complex processes used to transport shipments figure 3 that shows a transfer of shipments of the public postal operator between the long 201km, from the centre “A” (Vukmanic) in Karlovac’ County in place of “B” (Batinjani) in Bjelovarsko – bilogorska County. When you transfer a package are used different road motor vehicles in various categories, including roads and city roads. Only well planned UTP will allow to bring shipments from the place A place B at the fastest possible time, in some cases even within one day (the so-called “today for tomorrow”).

## 5 Mailing and sorting centre

Postal network is structured set of postal facilities and communications (among them) that use the postal funds in the entire geographic area have the aim to ensure the transfer of postal shipments. Organized under a set of facilities include a terminal node (post offices) and the transit nodes (postal centres) that cover specific geographical area, which creates a public postal network of the Republic of Croatia. The main task of every postal centre is to develop and concentrate/diffuse shipments to/from all post offices in your area. Given the large amount of shipments in the postal centres (download, transfer, develop and dispatching of postal parcels), which is mainly provided by various road vehicles, it is advisable to build a postal centre (terminal node, dispatch centres, logistics centres) in places outside the inner city areas and that are well connected with major traffic, especially roads, rail and airport. Postal centre must be built and maintained in accordance with Croatian and international standards and minimum technical conditions for construction and public operators. Current postal centres of public postal operators, which are required, in accordance with the public postal system operator, ensure the functioning of postal services and the performance of postal services in the manner prescribed by the acts of the Universal Postal Union and legal regulations, are not built according to plan. They are narrower in the inner-city and significantly slow down the technological processes in the transfer of shipments, especially in large cities and tourist centres. Using the city’s street network by large number of half – heavy and

heavy motor vehicles for transportation of shipments significantly affect the traffic load of city roads which has resulted in the creation of traffic congestion and decrease safety in road traffic. Also, large trucks, which among other things, transporting consignment shipments often cannot access the incoming platforms (sorting place), which has resulted in unnecessary loading of shipments, or for example, insufficiently developed road infrastructure (lack of traffic lights or turning the ban) has for consequence long and unnecessary driving in the city.

## 6 Conclusion

Postal service hasn't got its own roads, but it uses the roads and other means of transport industries. Therefore, the road transport infrastructure, which consists of all types and categories of roads and paths, including bridges, viaducts, tunnels, loops and road crossing with signs and buildings and equipment permanently fixed to a specific place which serves the production and regulation of transport services and traffic safety significance affects at the functioning of the postal services. It is exploited daily by the postal operators or their specialized vehicles for transportation of shipments which is impossible without functioning of modern postal services. Area of postal service is of great importance for the economy because of the number of employees and revenues realized by the market and the impact on communications, advertising and transportation. Development of postal services has achieved synergy effect in all segments of the development of infrastructure and services in Croatia. User requests at a permanent increase in the transfer speed of shipments are a key challenge for postal operators. Due to the specific geographical position of Croatia development and development of road infrastructure could play a crucial role in the future postal sector not only in Croatia but also in the wider region.

## References

- [1] Cerovac, V., "Tehnika i sigurnost prometa", Fakultet prometnih znanosti, Zagreb, Zagreb, 1997.
- [2] Županović, I., "Tehnologija cestovnog prijevoza", Fakultet prometnih znanosti, Zagreb, 1998.
- [3] Rotim, F., "Elementi sigurnosti cestovnog prometa", Fakultet prometnih znanosti, Zagreb, 1990.
- [4] Teahan, M. H., "Direct Mail Guide for Development and Least Developed Countries in the Digital Age", Universal Postal Union; Bern, March 2009
- [5] Nižić, N., "Pregled povijesti pošte, brzjava i telefona u Hrvatskoj", T-HT d.d., Zagreb, 2007.
- [6] Aščić, I., Mandić, I., "Izravna pošta kao projekt istraživanja i komunikacije s tržištem", *Suvremeni promet* br. 5/2008., Hrvatsko znanstveno društvo za promet, Zagreb, 2008.
- [7] Binički, M., Vukadin, D., "Security and protection of postal shipments in road transport", Collection of Papers 12th International Conference on Transport Science - ICTS 2009 Portoroz, Slovenia
- [8] Aščić, I., Binički, M., "Čimbenici zaštite poštanskih pošiljaka u pomorskom prometu", *Pomorstvo* br. 2/09, Pomorski fakultet u Rijeci, Rijeka, 2009.
- [9] Tabak, P., "Conceptual Technological Framework for Access to the Postal Public Network", Collection of paper, XVI International Scientific Symposium, Transport Systems 2009, Opatija, 2009
- [10] Pravilnik o poštanskom sustavu javnog operatora (Narodne novine br. 5/05 i 112/08)
- [11] Zakon o poštanskim uslugama (Narodne novine br. 88/09)
- [12] [www.posta.hr](http://www.posta.hr)
- [13] [www.upu.int](http://www.upu.int)
- [14] [www.mmpr.hr](http://www.mmpr.hr)
- [15] [www.prometna-zona.hr](http://www.prometna-zona.hr)

## 3 ROAD DESIGN

