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### **ANTI-STIMULATION" OF CAR TRIPS ON THE EXAMPLE OF EUROPEAN COUNTRIES**

**Abstract.** The article discusses measures to reduce the number of car trips in European countries. The influence of these measures on the traffic congestion of the transport and road network is also analyzed. The experience of the development of public transport is given. Measures to reduce the number of cars are proposed. Measures are proposed to encourage travel by public transport.

**Keywords:** traffic jams, public transport, transport system, transportation, urban environment.

**Аңдатпа.** Мақалада Еуропа елдеріндегі автомобиль сапарларының санын азайту шаралары қарастырылады. Сондай-ақ, келтірілген шаралардың көлік-жол желісінің жүктелуіне әсері талданады. Қоғамдық көлікті дамыту тәжірибесі келтірілген. Автомобильдер санын азайту бойынша шаралар ұсынылды. Қоғамдық көлікте сапарларды ынталандыру шаралары ұсынылады.

**Кілттік сөздер:** автомобиль кептелісі, қоғамдық көлік, көлік жүйесі, тасымалдау, қалалық орта.

**Аннотация.** В статье рассматриваются меры по снижению количества автомобильных поездок в странах Европы. Также анализируется влияние приведенных мер на загруженность транспортно-дорожной сети. Приведен опыт развития общественного транспорта. Предложены меры по снижению количества автомобилей. Предлагаются меры по поощрению поездок на общественном транспорте.

**Ключевые слова:** автомобильные заторы, общественный транспорт, транспортная система, перевозки, городская среда.

A sign of a liveable city is the combination of a healthy economy and stable social relations with a humanitarian-oriented urban environment, which is practically unattainable in "car-dependent" cities.

Transport planners from Germany, Switzerland, the Netherlands, Belgium, Sweden and a number of other countries, as well as from cities such as Singapore, Stuttgart, Vancouver and Vienna, have come to a unanimous recognition of the fact that cities with automobile dominance cannot be comfortable to live in.

On the way to the formation of a balanced transport system, where public transport and pedestrian communications dominate, and congestion becomes not the norm, but an exception to the rule, cities should apply two sets of policy measures:

- promoting (stimulating, encouraging) the use of public transport by improving the quality of mass transportation, in particular, ensuring the independence of the operation of routes and lines of public transport from the level of loading of the road network;
- countering (reducing attractiveness, antistimulation) car trips through regulatory, pricing and planning measures.

Measures to stimulate the use of public transport are not only to improve the quality of its services, but also to create conditions for maximum convenience and attractiveness of pedestrian

movement, the activation of which is an indispensable companion to reducing the share of automobile trips in the structure of urban communications.

This structural shift will be especially noticeable if measures to promote the use of public transport are implemented in conjunction with measures to discourage car travel.

Here we will give a brief description of the most important of these measures, tested in many cities around the world.

Subways operate today in many cities around the world: from 1955 to 2010, the number of these transport systems increased from 20 to 110. The construction of subways pursues two main goals.

Firstly, when performing large volumes of passenger transportation in megacities. Subways are superior to any other type of transport in terms of speed, reliability, safety, as well as unit costs per passenger. This main advantage of subways is equally evident in the largest cities of both developing and industrialized countries – for example, in Caracas, Sao Paulo, Moscow, Tokyo, Seoul and Beijing.

Secondly, subways (subject to proper standards of reliability, comfortable speed and quality of transportation) are able to create an attractive alternative to car travel. This goal is dominant for smaller cities, mainly for cities in industrialized countries with a high level of motorization of the population, such as Oslo, Lyon, Stockholm and Vienna. The presence of subways has a significant impact on the development of cities, the nature of development and land use.

These transport systems ensure high mobility of the population throughout large cities, including densely built-up urban centers and transport corridors connecting the center and the periphery. Due to the high carrying capacity and off-street tracing, subways significantly reduce the load on the road network and the demand for parking spaces. As a result, the city becomes more comfortable to live in, and its functioning becomes more stable.

There was a trend in which cities, as the subway network developed, abandoned trams and were limited to a bimodal system consisting of metro and "street" bus routes operating in the general flow of vehicles.

This was the case in London, New York, Washington, Paris, Hamburg and many other cities. This bimodal model turned out to be not very effective: bus routes operating in the general flow of vehicles could not provide acceptable speed and reliability of transportation, and subways did not guarantee sufficient coverage of the urban area due to the high cost of constructing new lines.

In recent decades, it has become obvious that for most large cities, one or another type of public transport is needed, occupying an intermediate place between subways and "street" bus routes.

Such an "intermediate" mode of transport must have the right of preferential passage ROW-B with a priority phase of traffic light regulation at intersections. Its construction requires 3-5 times less investment than for subways, and it provides a significantly higher level of service than "street" bus routes.

The role of such "intermediate" types of public transport is most successfully played by the LRT systems, also known as the "light metro" or Stadtbahn in Germany. In recent decades, LRT systems have been built in about 100 cities around the world. In most cases, the LRT were advanced versions of traditional tram lines. They provided for separate low-noise track structures traced along the centerline of city streets, and articulated comfortable cars of large capacity. In the central part of the city, LRT lines could have small tunnel sections, as well as sections passing through pedestrian zones.

In terms of its operational indicators, the "light metro" is much more similar to the subway than to conventional tram lines. This transport system allows for many varieties. In some cases, it complements the subways in the central part of the city or in suburban areas (Paris, London, Berlin, San Francisco).

In other cities, such as Cologne, Stuttgart, Dallas, Calgary, Birmingham, the "light metro" is the basic public transport system serving large "city –suburb" transport corridors.

In recent years, bus and trolleybus route systems have been put into operation in many cities around the world, especially in developing countries (Brazil, Mexico, China), traced exclusively along separate lanes throughout their entire length. These systems of bus rapid transit (their abbreviated name BRT has now become generally accepted) differ from LRT in lower capital intensity, but higher operating costs due to greater labor intensity: the driver in the BRT system operates a bus with a nominal capacity of 80-140 passenger seats, while in LRT-a train designed for 250-750 passenger seats.

On the other hand, the construction of BRT requires less time than the construction of LRT: the examples of Bogota (Colombia), Beijing (China) and Ahmedabad (India) show that the time required for the appearance of BRT systems is indeed very short. BRT performance indicators (speed of communication and regularity of traffic) largely depend on the work of the local police to ensure the conditions of priority travel. Unfortunately, in many cities, the police work extremely inefficiently.

In terms of comfort and quality of transportation, BRT systems are inferior to rail transport systems, while BRT services are much better than those that can provide regular buses and minibuses operating on congested streets without any priorities in traffic. It can be argued that the introduction of BRT contributes to the switching to public transport of significant volumes of passenger traffic and significantly improves the mobility of the city.

The arrangement of local isolated lanes on certain sections of the road network is much less efficient than the construction of integral BRT systems. However, even this simple measure can improve the operation of trolleybus and bus routes and thereby contribute to reducing congestion by switching to public transport for a certain number of daily car owners.

In addition to the engineering measures described above aimed at improving the operation of public transport, numerous organizational, managerial and tariff plan innovations were also proposed in many cities in Europe and a number of East Asian countries. It should be mentioned, in particular, the introduction of certain self-service systems when paying for travel, electronic smart cards, through fares for trips on various types of public transport. Of particular interest are the activities aimed at the organizational and technological integration of various types of public transport. Here we will focus on two particularly successful innovations in this area.

Let us draw attention to the significant progress made in many cities around the world in integrating various types of mass urban transport. For the passenger, the best scenario occurs when all types of public transport – metro, city and suburban buses, suburban railway lines - are an integrated system with convenient transfer hubs, agreed schedules and through fares.

In many cities, however, nothing like this was observed. The presence of many independent transport companies owned by different owners led to the fact that each trip by several modes of transport (or several routes) turned into a loss of time for the passenger due to inconsistent schedules, as well as the need to re-pay for travel.

In recent decades, unified public transport tickets have been introduced in many cities, operating on lines and routes discussed by any carrier companies. The distribution of income from the sale of such tickets between the carrier companies was carried out on the basis of mutually agreed calculation formulas. Such integration enjoyed widespread public support, and its introduction equally everywhere led to a noticeable increase in the volume of public transport.

Let us now turn to measures aimed at countering (reducing attractiveness, anti-stimulation) car trips. The set of these measures is very extensive and diverse. However, their implementation is extremely difficult due to the inevitable opposition from various public, commercial and state institutions.

They are divided into clusters related to planning and design solutions, regulatory regulation, traffic management, as well as economic policy in the field of tariffs, fees and payments.

When choosing measures that affect the use of private cars, it is important to understand the main motives of a citizen who makes a choice between traveling by car or by public transport. In most cases, a citizen considers mainly his direct ("paid out of pocket") travel costs in each of these ways.

A car owner is not inclined to take into account his investment expenses (for the purchase of a car, maintenance, insurance, etc.). In addition, he in no way compensates for social (congestion-related), as well as environmental and other costs that fall on other citizens and the city as a whole.

Direct expenses of a car owner in the case when he does not have to pay for parking, as a rule, do not exceed 10-20% of the total cost of a car trip. In these conditions, car trips turn out to be incredibly cheap in the eyes of most car owners.

This factor plays a decisive role at the systemic level in the occurrence of congestion and the paralysis into which the entire street and road network of the city regularly falls.

In the transport policy in relation to the use of cars for city trips, it is necessary to distinguish two basic elements. The first of them consists of measures aimed at increasing the capacity of the existing road network in coordination with available parking facilities.

The second basic element is related to limiting the intensity of car use in order to maintain the correspondence of supply and demand with capacity and, accordingly, to prevent congestion. The most effective measure here is demand management by limiting the number and pricing of parking spaces.

In addition, a very effective method of setting fees for the use of certain sections of the city's road network is being increasingly used to manage demand. This measure was initially very unpopular, but became politically acceptable as the public realized a simple alternative: pay and drive in acceptable conditions or not pay, but spend hours in traffic jams.

The list of transport policy measures aimed at improving traffic conditions and preventing chronic congestion on the road network is always associated with unavoidable restrictions on demand and should include the following items:

- application of modern methods of traffic management in order to make the most efficient use of available resources of the road network;

- reconstruction of intersections at the same level, which are bottlenecks from the standpoint of the system capacity of the road network as a whole;

- organization of one-way traffic on all sections of the network, where this measure will contribute to increasing system capacity;

- introduction of a tightly regulated parking regime, primarily on streets where parked cars reduce their capacity;

- providing advantages in the movement of public transport cars (in particular, trams and trolleybuses), including: separation of track structures, the allocation of separate lanes, the provision of priority green phase at intersections in the same level;

- introduction of parking tariffs with a progressive hourly rate, aimed at significantly increasing the fee for long-term parking. This measure saves the city from the need for active construction of multi-storey parking lots, especially in the city center;

- introduction of norms obliging each car owner to acquire a legalized parking lot at the place of residence;

- introduction of speed limits and through passage on residential streets;

- transformation of streets with significant pedestrian traffic and chronic congestion into pedestrian zones;

- introduction of fees for the use of individual sections of the road network.

These measures should be considered very effective and perhaps the only real way to prevent congestion in large cities.