

BRT: MODERN TRANSPORTATION TECHNOLOGY

Public transport plays a significant role in life of modern society. Nowadays new kinds of transportation were created and successfully used by everyone. A bus, a train, a tram, a subway and a lot of other types of transportation means are an integral part of every small village and densely populated city. Bus Rapid Transit (BRT) is a transportation system which provides services based on regular transit buses and has a specific design and infrastructure. This system provides a powerful platform for future development of public transport due to its use of modern intelligent transport systems (ITS) and introduction of new methods of managing vehicles. It is one of the most efficient and reliable transportation systems and is relatively cheap to implement. The main purpose of this project is to provide all basic information about BRT system, its aim, structure and areas of use. The project presents a variety of points of view on BRT advantages and disadvantages in comparison with other types of public transport. The focus is also on the transport system in Zhytomyr city (Ukraine) and the main issues with the BRT deployment in the city. Bus Rapid Transit (BRT) is a complex transportation system of public transport which was made to combine both railway transport and buses in terms of mobility, safety, reliability and speed. It is very difficult to make a right definition of BRT because of its composite structure. BRT is a system of vehicles, places, routes and tools which makes them work properly and suitably for people.

Typical BRT systems have the following features:

- Bus only, grade separated right-of-way lanes;
- High-frequency all day service;
- Off-bus fare collection;
- Level boarding stations;
- Vehicles with tram-like characteristics.

The first BRT system was created in Curitiba, Brazil in 1974. Its creation promoted further development and by the end of 1970's similar projects were successfully implemented in North and South American continents. Later such systems were opened in Ecuador, Colombia and the USA in 1996, 1999 and 2000 respectively. The longest BRT route was built in Johannesburg in August 2009 with the total length of 172 km. It was the first true BRT route in Africa which can daily transport approximately 42,000 passengers. First BRT system in Asia was made in Jakarta, Indonesia in 2004 with the name "TransJakarta". It was available to use free of charge during the first two weeks after creation. In February 1, 2004 commercial operations were introduced. Nowadays almost 166 cities in all over the world use BRT systems and their number is growing from year to year.

All kinds of public transport were created to make the transportation of people fast, safe and more comfortable. Unfortunately the public transport that we are using has many drawbacks. There is no ideal system for people's transportation in the world but to make it better for people it is important to keep pace with the progress. One of the steps which was made in this direction is a BRT. However, this system also has its own advantages and disadvantages. The advantages of BRT are the following:

1. The buses are more flexible than the trams, so they can make more maneuvers on the route to avoid objects and accidents.
2. In the places where light rail transport is impossible to organize the BRT can be set as an alternative. The BRT vehicles almost never cause traffic jams because of using separate lane on the road.
3. It is cheaper to change the BRT route than light rail system or metro. For instance, in megalopolises the number of new employment centers is increasing and transportation of people is vital, so the BRT system can be integrated with minimal cost and maximum efficiency.
4. The BRT transportation is quicker than usual buses, has more qualitative approach and is safer. The aim of BRT is to increase the transportation speed and the system manages this successfully.
5. With the help of articulated vehicles it became possible to meet the demand of huge passenger flows.
6. BRT system can significantly reduce the carbon dioxide (CO₂) emissions. Electricity which is used for the LRT system is obtained from fossil fuels, which produce much more CO₂ emissions.

The disadvantages of BRT are:

1. There are long queues at the stations during the rush hours so there is often a crowd of people.
2. The BRT roads construction doesn't lead to redevelopment of its service area. If that route isn't needed for use we can change it. Also the service area around the route will be useless.
3. The BRT system cannot attract discretionary riders because riding a bus is often associated with the poor.

There are 12 trolleybus lines, 1 tram and 25 bus routes in the current system of Zhytomyr city transport. 24 private transporters including 6 private transport companies serve 25 bus routes.

The automated navigation of public transport system is created for the purpose of organizing, streamlining the movement of suburban bus routes and increasing the capacity of streets, reducing duplication of suburban electrical transport and bus routes. Now all buses on city bus routes are equipped with GPS-trackers.

The priority areas of work in the field of transport in the city are:

- Organization and coordination of passenger transport;
- Improving and optimization of the bus network;
- Improving the quality of services for passenger electric and motor transport;
- Replacement of minibuses to buses of a medium and a large class;
- Modernization and technical re-equipment of city electric transport;

- Streamlining traffic of suburban bus routes;
- Organizing and conducting commissions for road safety;
- Introduction of GPS-monitoring and control of public transport.

With the expansion and urbanization of cities, leading to an aggravation of traffic congestion and a large number of transportation vehicles, there is an increasing need for highly capacitive and high quality transport system. BRT enables rapid transportation of people over long distances.

It is hard to develop a BRT system in Zhytomyr, because of insufficient funding and economic crisis in Ukraine. However, we have already prepared different stages to integrate BRT: ITS technology and the "Information for travelers in real time"; a system of priority for passengers transportation on intersections; a system of intermodal transport with other types of passenger transport; clean environmental technologies for buses; improving the quality of passenger service.