



What are the ideal conditions for using cargo bikes in cities?

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I CARGO BIKE USERS

Introduction

The number and structure of cargo bike users is expanding along with the availability of different types of cargo bikes. The behavior of these users in traffic can affect the traffic flow in the city to varying degrees. Each user may have different preferences, which also depend on local conditions. Users of cargo bikes can be divided into two main groups - commercial users and private users. Both groups can be divided into subgroups of users who share certain common features.

I.1 COMMERCIAL USERS

The group of commercial users includes:

- courier service providers (mail and parcel delivery, see Fig.1),
- delivery services (e.g. food, groceries, flowers),
- specific delivery services (e.g. blood samples),
- mobile sales (Fig.2),
- municipal waste collection.

The main goal for courier and delivery services is to serve a given number of customers as quickly as possible. In this case, the couriers move in regular traffic. They can use cycle paths and roads together with motorized vehicles. Commercial cyclists have very limited possibility to adapt the route and timing of the ride to current conditions, such as weather or traffic. Because of this, e.g., it may happen that the commercial cyclist may be at increased risk of collisions and injury during peak-times of traffic.

Mobile bicycle shops are usually moved to the point of sale in the morning, where they offer their services during the day, and they return to the home depot after the sale ends. They can also change the point of sale during the day. Therefore, they move for a shorter time in regular traffic, partly at peak times. Cargo bike for mobile sale often has a unique shape and dimensions and, depending on the type of load, can move more slowly, which can also affect the traffic flows.

Waste collection service usually uses predetermined routes with predetermined points of service, which are served in given times. In this case, it is possible to schedule the system to avoid peak times of traffic.

I.2 PRIVATE USERS

Private users use cargo bikes:

- for the transport of children (to kindergarten, school, leisure activities...),
- for shopping (food and consumer goods),
- as a transport mean for people with reduced mobility.

What all private users have in common is that they can easily choose another mode of transport in case of unfavorable conditions (e.g. weather). The user who takes children to

kindergarten is likely to prefer the safest possible routes. The timing of the ride depends on the purpose of the trip (e.g. school times) and it is therefore not always possible to avoid peak-times of traffic.

It is difficult to generalize the preferences of users who use cargo bike for shopping. In this case, the experience and personality of the cyclist will be largely decisive. These users have very good possibility to plan a ride outside of peak-times of traffic.

The group of people with reduced mobility is relatively diverse and can use the cargo bike as a means of transport, but also for shopping. This group of users will pay attention to safety and will move slowly. At the same time, this group of users has very good possibility to plan its ride according to current conditions.

A specific group of cargo bike operators/users consists of providers of cargo bike sharing systems and cargo bike rental systems.



Fig. 1 Cargo bike for parcel delivery
([JoachimKohlerBremen](#), [Ups Elektro-Lastenfahrad in Oldenburg \(Oldb\)](#), CC BY-SA 4.0)



Fig. 2 Cargo bike as a mobile fastfood
(Dante's /// View, [Hot-Dog Cargobike 01](#), CC BY 4.0)



Fig. 3 Cargo bike for transporting people ([Zorro2212](#), [Freight bicycle rental in Łódź](#), CC BY-SA 4.0)

2 CLIMA AND TERRAIN

Introduction

The cargo bike operator is supposed to adapt to predetermined conditions such as climate and terrain, characteristics and condition of the transport infrastructure and legislative measures. For example, he can select the suitable bike, the appropriate operating technology, the business model, etc...Demanding climatic and terrain conditions can place high demands on the physical condition of the bicycle driver. Unlike the private journeys, the courier cannot decide not to ride in bad weather. These conditions can result in lack of cargo bike drivers or in high turnover of bicycle drivers. Better conditions can be partially ensured by a suitable bicycle construction - from bikes with simple rain top covers to fully covered electric multi-wheels bikes.

2.1 SITUATION IN EUROPE

We analyzed local conditions in 126 cities with cargo bikes systems from 20 European countries. The map in Figure 4 shows both smaller cities and large urban areas with different terrain conditions. The cities with population over 100000 represent the majority with total of 73%. Only 16 cities (12%) are in the category up to 50,000 inhabitants. Larger cities with a large group of potential customers are more suitable for the use of cargo bikes.

Cargo bikes are most used in the United Kingdom (21 cities). In another six countries, cargo bikes are operated in more than 10 cities (Spain, Belgium, Italy, the Netherlands, Germany, and France). These countries belong to area with mild climate within Europe. A large part of the territory is flat and bicycle transport has a long tradition in these countries. Approximately 50% of the analyzed cities is located mainly in flat areas, only approximately 10% are cities with mostly hilly terrain in mountainous or foothill areas. Electric bikes are more suitable for areas with more demanding terrain conditions.



Fig. 4 Selection of European cities with cargo bike delivery service (based on mapy.cz and ECLF)

2.2 AVERAGE TEMPERATURES

Figures 5 and 6 show the number of cities according to the average temperatures in January and July. The year-round use of cargo bike in Europe can be influenced by weather fluctuations during the year. In winter, temperatures can drop below freezing point, it can be windy with snowfall. High temperatures in summer can also be a problem. Such conditions place high demands on the physical condition of the bicycle driver. The analyzed data show that in cities with cargo bikes, the average January temperatures are most often in the range of 0.5-5°C and the average July temperatures are in the range of 17-20.5°C. The average annual precipitation in the analyzed cities varies between 300 mm (Murcia) and 1738 mm (Donostia/San Sebastian).

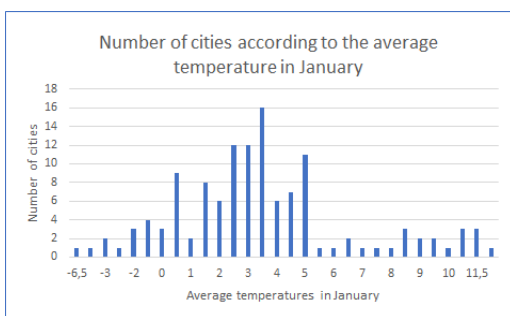


Fig. 5 Number of cities according to average temperatures in January

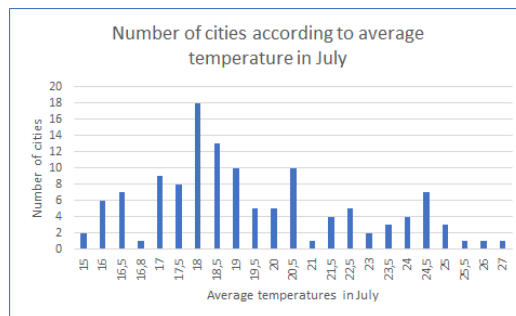


Fig. 6 Number of cities according to average temperatures in July

However, even in the case of less favorable conditions, it is possible to implement a successful system by choosing a suitable business model and the right type of bike. This is proved by [examples from Sweden](#) (Umea with January temperatures around -6.5 ° C) or Spain (Seville with very hot and dry summers).

The Czech Republic does not have typical conditions for the operation of cargo bicycles. The country is relatively mountainous with lower average January temperatures than in countries where cargo bikes are most common. However, there are cities where bicycle transport has a long tradition and local conditions are favorable.



Fig. 7 Cargo bike in winter ([JoachimKohler-HB](#), [TCS Carvelo Riese & Müller Lastenvelo](#), [CC BY-SA 4.0](#))

3 TRANSPORT INFRASTRUCTURE AND LEGISLATION

The condition of the transport infrastructure and its characteristics can affect the speed and reliability of the delivery service. Narrow cargo bikes are more suitable for traffic in narrow streets in historic city centers, but they have a smaller loading capacity. Local regulations and legislative measures can also affect the operation of cargo bikes. E.g. cargo bikes can gain an advantage of unrestricted entry in locations with limited motor traffic. Legislation in different countries may define e-bike within categories of road vehicles in different ways. Cargo bicycles that fulfill the terms of a bicycle can also use the infrastructure for cyclists

Many cities have already learned to apply measures to support cycling. These measures include both building and transport organizational elements and measures that help to use bicycles safer and more comfortably. Roads for cyclists are being created in the main and associated traffic areas. However, these measures support primarily "passenger" bicycle transport, and therefore the parameters of the roads correspond to the driving profile for single-track bicycles, or bicycles with a two-track trailer (especially for children).

For this reason, such an infrastructure may not always fulfill the requirements of cargo bicycles, which have a wider riding profile due to their dimensions.

As a part of urban mobility planning, cargo bicycles should be the preferred means of transport within city logistics. The adaptation of urban infrastructure should be the active preference. It is not possible to full use of the existing cycling infrastructure due to the wider driving profile of cargo bike, which depends on the size and design of the cargo space. Even so, their advantage in terms of size and environmental friendliness should be used to the full, as it is in the case of passenger cycling. The parameters of roads for cyclists should be based on the dimensions of the so-called standard vehicle, ie the largest bicycle for which it is proposed.

Significant roads, the so-called integrated corridors, should be accessible to cargo bikes through integration measures. These roads tend to be more congested with car traffic and public transport, but are inherently attractive in their straightforwardness, speed, and reliability. They also have an important transport function in addition to the service function (they can also contain sources and destinations for cargo bikes). The measures on these roads should be directed mainly to the main traffic area (e.g. different types of reserved lanes).

Quiet and calm roads and zones that are used for movement within the transport service area should also be accessible to cargo bikes. There is usually no need to create special measures on these roads. Measures for bicycle transport are applied as additional measures to ensure clarity and safety of the area. However, it is important to be aware of the wider passage profile in these cases so that the permeability is maintained also for cargo bikes (e.g. measures for two-way roads for bicycles).

The permeability of the cargo bike area should be maintained within the framework of protected cycling routes and connections. The parameters of roads for cyclists must be adjusted so as not to endanger the safety of movement of pedestrians using the associated



traffic area (separation of pedestrians and cyclists, adjustment of construction parameters, etc.).

References

SEIDLOVÁ, A., LEDVINOVÁ, M. The Influence of Local Conditions on the Use of Cargo Bikes for Last Mile Delivery. In *Transport Means: proceedings of the international scientific conference*. Kaunas: Kaunas University of Technology, 2020, s. 398-402. ISSN 1822-296X.

SEIDLOVÁ, A., LEDVINOVÁ, M. Analysis of Possibilities of Integrating Cargo Bikes into Urban Space. *Transport Means : proceedings of the international scientific conference*. Kaunas : Kaunas University of Technology, 2021, s. 520-524. ISSN 1822-296X.