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SJIF IMPACT FACTOR (2021: 5.478) (2022: 5.636)

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**Research Article** 

# ANALYSIS OF PASSENGER FLOW OF BUS ROUTES OF **FERGANA CITY**

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Khujamqulov Sardor Umidjon Ogli

Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan

#### ABSTRACT

The flow of passengers and the impact of their flow on traffic were analyzed. Also, the processes of using passengers in public transport are reflected.

### **K**EYWORDS

Passenger, stream, transport, bus, minibus.

## INTRODUCTION

The flow of passengers, its quantity and other depend primarily characteristics on passenger's transport mobility. **Transport**  mobility of a passenger refers to the amount of transport used in a certain period of time (usually one year) [1-4].

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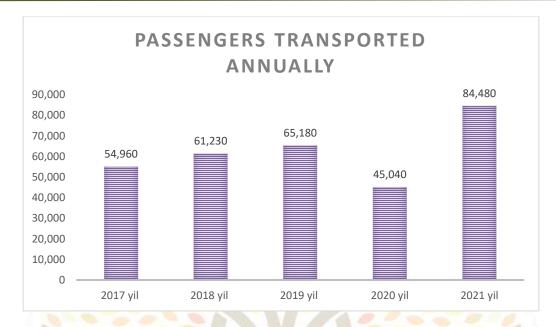


Figure 1: Histogram of annual transported passengers (thousands of passengers).

In this histogram, it is possible to observe the change in the passenger's use of public transport over the years. 54.9 million passengers in 2017, 61.2 million passengers in 2018, 65.2 million passengers in 2019, 45.0 million passengers in 2020, and 84.5 in 2021 million passengers were served [5-11]. The development of the transport sector, provision of routes with convenient means of transport, and provision of transport services at affordable prices to passengers have increased the demand for transport services for Fergana city passengers year after year.

The number and time of the passenger's use of transport depend on the purpose of using the transport (work, study, recreation, etc.). Studies show that in 60-65% of cases the passenger uses the transport to go to work or study. It should be mentioned here that the transition to the market economy led to an increase in passenger traffic. Passengers who need to be transported in a certain direction and part (section) of roads are called passenger flow [12-21].

In order to fully satisfy the passenger's demand for transportation and provide them with highquality transport service, information about the flow of passengers and their descriptions is needed:

- 1. The volume of passenger transportation in the entire direction
- 2. Distribution of the flow of passengers according to sections of the route (between stops).
- 3. Distribution of passenger flow by hours of the day.

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- 4. Passenger circulation.
- 5. Average passenger transportation distance.
- 6. Exchange rate of passengers.

When studying the flow of passengers, they can be depicted in the form of graphs, maps, cartograms, cyclograms or tables. The flow of passengers is unevenly distributed according to the length of the route and hours of the day. If we look at the changes in the flow of passengers by the hours of the day, then it is possible to observe two periods when the flow of passengers is the largest. These periods are called rush hour. There are currently 8 bus routes operating in the city of Fergana. Including Bus route number 3 "Center-Yormozor, New Margilan";

5- numbered bus route "Center - Jami"

Bus route number "Center Airport (roundabout)"

7- numbered bus route "Center - Kadiry"

8- numbered bus route "Center - Kirguli"

14- number bus route "Center - Boltakol"

17- number bus route "Center - Khojamagiz"

20- numbered bus route "Center - Akariq"

Table 1. The flow of passengers entering the city of Fergana is unevenly distributed by hours of the day

Day/h <mark>o</mark> ı	ur To the center		From the center		Total
	%	Passenger Passenger	%	Passenger	
6-7	5.4	6 540	2.7	3029	9 569
7-8	11.0	13 234	4.2	4 83 <mark>7</mark>	18,071
8-9	11.4	13 675	5.5	6 266	19,941
9-10	11.0	13,300	4.8	5 464	18,764
10-11	8.3	9 956	8.2	9 345	19 301
11-12	8.8	10,639	7.5	8 526	19 165
12-13	7.3	8 849	8.5	9 749	18,598
13-14	8.1	9 789	8.1	9 291	19,080
14-15	6.6	7 944	8.4	9 549	17 493
15-16	6.4	7 723	9.2	10 471	18 194
16-17	6.2	7 442	9.8	11 240	18 682
17-18	3.3	3 932	10.8	12 285	16 217

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18-19	3.3	3 972	7.2	8 271	12 243
19-20	2.9	3 460	5.2	5 918	9 378
n=14	100	120 455	100	114241	234 696

These routes connect remote areas with the central part of the city. Bus route number 8 the crowded areas runs from "Kirguli district" along Fergana street, "Fergana Polytechnic Institute", "Joydam", "Center" and "Oybek" maternity hospital. doesn't end These areas are busy areas for bus route 8.

Determining the number of daily transported passengers and passenger-kilometers performed. The number of passengers carried daily is determined by adding the number of passengers carried every hour on forwarding and backward routes:

 $Qk = \sum Qs$ , path.

Ok = 120 454+114 240=234 694 passengers

where: Qs is the number of passengers transported per hour on the route.

Pk = (, pass km

Pk = (120 454+114 240)\*5.8=1 361 225 pass km

where: lot is the average travel time of one passenger (obtained according to A/S information). Determining the number of buses required to work on the route, the interval and frequency of operation The number of buses required to operate the routes

where: Qmax is the maximum number of passengers transported during one hour;

tail-bus rotation time, hour;

qn – nominal capacity of the bus, route. [21-33]

The change in the flow of passengers by hours of the day is described by the coefficient of the unevenness of the flow of passengers by hours of the day:

where: Qmax is the largest hourly passenger flow (in all directions);

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Kort is the hourly average value of the passenger flow by direction. Distribution of passenger flow by hours of the day and sections of the route. The amount of passenger flow can be distributed differently depending on the direction in which the passengers are moving. This is unevenness estimated using the coefficient unevenness in the direction of the flow of particles:

Statistical information about the flow of passengers can be determined using various methods:

- questionnaire;
- robbery;
- observation with the eyes;
- table;
- questionnaire;
- ticket

It is also worth mentioning that the flow of passengers can be studied in general (the entire city, district or route of buses is covered) or in a selective way (a part of the city, district or route of buses) [34-47]. Which method to use is chosen based on the purpose of determining the flow of passengers.

**Eve observation method.** This method is much simpler and, at the same time, approximate, and is used to study the flow of passengers at the most loaded stations of the route. For this purpose, the accountants stand at the bus stops and estimate how many passengers are inside the bus using a six-point system

- 1 point more than half of the seats are empty;
- 2 points all seats are occupied;
- 3 points all the seats are occupied and half of the places intended for standing are occupied;
- 4 points the capacity of the bus is being almost completely (2 used passengers correspond to 1 square meter of free space);
- 5 points the capacity of the bus is being fully used (4 passengers fit into 1 square meter of free space);
- 6 points the bus is full and passengers cannot get on it (8 passengers fit into 1 square meter of free space).

When using this method, in order to correctly determine how many passengers are travelling in the vehicle, it is necessary to pay special attention to the model of the bus and the fact that the seats have not changed compared to the ones in the factory where the bus was manufactured. This method is more convenient to study passenger flow in Fergana city. The reason is

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that there are many bus routes, the use of bus services is higher, and this method is much simpler and at the same time approximate to study the flow of passengers at the most loaded stops of the route [48-54].

used for 5 points on the buses in Fergana city the capacity of the bus is being used almost completely (2 passengers correspond to 1 square meter of free space);

Since the method of visual observation is simple and requires relatively little work, it is appropriate to use it regularly in each direction to study the flow of passengers by hours of the day, days of the week, and seasons of the year.

The flow of passengers on the 8th bus route belonging to "Fergana Favorit Avto Trans" LLC in the city of Fergana was studied by visual observation.

The results of the 8th bus route-based on passengersuneven distribution of the flow by hours of the day were studied:

The coefficient of the unevenness of the change of passenger flow by hours of the day (at 7:00 -10:00):

It can be seen that the flow of passengers varies greatly by the hours of the day.

There are two rush hours in the direction, it is between 700-1000 in the morning and 1500-1800 in the evening. So, at this time, it is necessary to use new methods for transporting passengers.[11]

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