

METHODS OF RESEARCHING TRANSPORTATION DEMANDS AND OTHER TRAVEL CHARACTERISTICS

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Sustainable Transportation within the Framework of Green Deal - SPHERE

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Methods of researching transportation demands and other travel characteristics

- 1. Systematic counts*
- 2. Control counts*
- 3. Processing of counting data and application of computers*
- 4. Passenger survey of the JGPP (Public Urban Passenger Transport)*
- 5. Manual processing of the survey (without a computer)*

Transport demands are variable in space and time



These changes have their own regularities, which are determined by specific research methods.

The objective of these studies is

- the quantification of transport demands in space and time, and
- the determination of regularities in their variation over time,
- as well as the identification of other characteristics of passenger
- flows, passengers, and traffic characteristics within the service area.

**In urban areas, continuous changes
occur due to:**

**THE CONSTRUCTION OF RESIDENTIAL, COMMERCIAL,
INDUSTRIAL, AND OTHER ZONES, OR THEIR
RECONSTRUCTION.**

**AS A RESULT, THE LOCATIONS OF TRIP ORIGINS AND DESTINATIONS
CHANGE.**

**THIS LEADS TO CHANGES IN THE CHARACTERISTICS OF
PASSENGER FLOWS AND THEIR KEY VALUES.**

**EACH SUCH CHANGE IN THE URBAN STRUCTURE REQUIRES
RESEARCH ON PUBLIC TRANSPORT (JGPP) LINES WITHIN WHOSE
CATCHMENT AREA THE CHANGE HAS OCCURRED**

TRANSPORT DEMAND RESEARCH (DATASET)

FOR DIFFERENT TRANSPORT NEEDS, NUMEROUS DATA ARE COLLECTED IN VARIOUS WAYS.

According to the method of acquisition and their characteristics, all data are divided into two main groups:

- **Statistical and accounting data, and**
- **Data obtained through research:**
 - **Passenger counting and surveying, and**
 - **Traffic monitoring/recording.**

AT THE FACULTY OF TRANSPORT AND TRAFFIC ENGINEERING IN BELGRADE, METHODS FOR PASSENGER COUNTING AND SURVEYING HAVE BEEN DEVELOPED, WHICH HAVE BEEN VALIDATED THROUGH THE PREPARATION OF TRANSPORT STUDIES FOR VARIOUS CITIES. THESE METHODS PROVIDE THE BASIC CHARACTERISTICS OF PASSENGER FLOWS FOR THE DESIGN OF TRANSPORT PROCESSES.

1. SYSTEM COUNTING

SYSTEM COUNTS ARE DETAILED PASSENGER COUNTS BY LOCATION AND TIME ON A SINGLE LINE OR ACROSS THE ENTIRE NETWORK OF LINES IN A CITY.

THE OBJECTIVE IS TO OBTAIN THE BASIC PARAMETERS THAT CHARACTERIZE PASSENGER MOVEMENT ON A LINE, SUCH AS:

- Number of passengers,
- Entries and exits along the line,
- Passenger flow,
- Average trip length, and
- Passenger exchange.

IN THIS WAY, INDICATORS IMPORTANT FOR TRANSPORT ORGANIZATION ARE OBTAINED (such as the alignment of transport demand and capacity, seat occupancy rate, etc).

1. SYSTEM COUNTING

SYSTEM COUNTS ARE CARRIED OUT BY HUMAN COUNTERS WHO ARE LOCATED INSIDE THE VEHICLE.

IF THE NUMBER OF VEHICLES ON THE LINE IS GREATER THAN THE NUMBER OF STOPS, THE COUNTERS MAY BE POSITIONED AT THE STOPS (< PEOPLE)

COUNTERS ARE PREVIOUSLY PREPARED AND TRAINED, AND DURING COUNTING THEY RECORD DATA IN A PREPARED 'COUNTING SHEET.'

SYSTEM COUNTING IS CONDUCTED IN TWO PHASES:

- the preparation phase, and
- the execution phase..

THE PREPARATION PHASE INCLUDES IMPORTANT TASKS WHOSE QUALITY DIRECTLY AFFECTS THE RESULTS OF THE COUNTING (such as the season of the year, month, week, day of the week, time of day, etc.).

IDENTIFIKACIONI DEO

Broj linije	Smer	Vozilo po redu	Broj obrta
	1		

1 2 3 4 5 7 7

Redni br. stanice	Naziv stanice	Redosled slogova	Vreme polaska	putnika	
				ušlo	izašlo
1		1			
2					
3					
4					
5					
6					
7					
8					
9					
10		2			
11					
12					
13					
14					

17					
18					
19					
20					

27					
28		4			
29					

35					
36					
37		5			
38					
39					
40					
41					

UKUPNO

IDENTIFIKACIONI DEO

Broj linije	Smer	Vozilo po redu	Broj obrta
	2		

1 2 3 4 5 7 7

Redni br. stanice	Naziv stanice	Redosled slogova	Vreme polaska	putnika	
				ušlo	izašlo
1		1			
2					
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36					
37		5			
38					
39					
40					
41					

UKUPNO

1. SYSTEM COUNTING

Сл. 1 Бројачки лист

1. SYSTEM COUNTING

IN ADDITION, THE PREPARATION PHASE INCLUDES THE FOLLOWING TASKS:

- Detailed familiarization with the route network, coding of routes and stops, and determination of inter-stop distances,
- Defining counting sheets for each route separately,
- Determining the required number of counters and their work schedules,
- Preparing instructions and identification for counters,
- Training drivers through seminars,
- Preparing and informing transport personnel,
- Informing the public, and
- Establishing an operational unit for managing and supervising the counting process..

1. SYSTEM COUNTING

THE 'EXECUTION OF COUNTING' PHASE BEGINS WITH THE COUNTERS REPORTING TO THE OPERATIONAL UNIT AND ARRIVING AT THE INITIAL TERMINALS.

COUNTERS ARE PROVIDED WITH FOLDERS CONTAINING THE REQUIRED NUMBER OF 'counting sheets' (ONE FOR EACH TRIP CYCLE)

AFTER THE COUNTING IS COMPLETED, THE COUNTERS SUBMIT THE FOLDERS WITH THE COMPLETED COUNTING SHEETS TO THE OPERATIONAL UNIT.

FOR THE EXECUTION OF COUNTING, 'RESERVE COUNTERS' ARE PROVIDED IN ORDER TO AVOID UNEXPECTED SITUATIONS.

FOR THE SUCCESS OF THE COUNTING PROCESS, IT IS VERY IMPORTANT THAT THE TRANSPORT PERSONNEL ARE INFORMED ABOUT THE IMPORTANCE OF THE OPERATION AND COOPERATE WITH THE COUNTERS AND ASSIST THEM IN THEIR WORK.

2. CONTROL COUNTING

CONTROL COUNTING IS USED TO DETERMINE THE 'DESIGN FLOW' ON CHARACTERISTIC SECTIONS, I.E., AT 'K' STATIONS.

This task can be carried out in two ways:

- By counting passengers during the normal stop of the vehicle at the station, and if the vehicle is full,**
- By estimating the number of passengers in the vehicle (which may lead to larger errors).**

By counting passengers at several stations from the initial terminal to station 'k', or from station 'k + 1' to the final terminal, depending on the position of station 'k' (high accuracy).

If passenger counting is performed (second case), the 'design flow' is determined through calculation, depending on the position of station 'k'."

3. DATA PROCESSING OF COUNTING RESULTS AND USE OF COMPUTERS

DUE TO THE LARGE VOLUME OF DATA, PROCESSING IS EFFICIENT AND RATIONAL ONLY WITH THE USE OF COMPUTERS.

PREPARATION FOR PROCESSING INCLUDES CHECKING AND ENTERING DATA INTO APPROPRIATE FILES.I

T IS NECESSARY TO EXPLAIN WHICH DATA ARE USED TO DEFINE EACH LINE (LIST THEM).

Line code

Line name and number

Number of stops by direction

Maximum number of vehicles on the line

Number of vehicle types with different capacities

Vehicle capacity of a homogeneous fleet

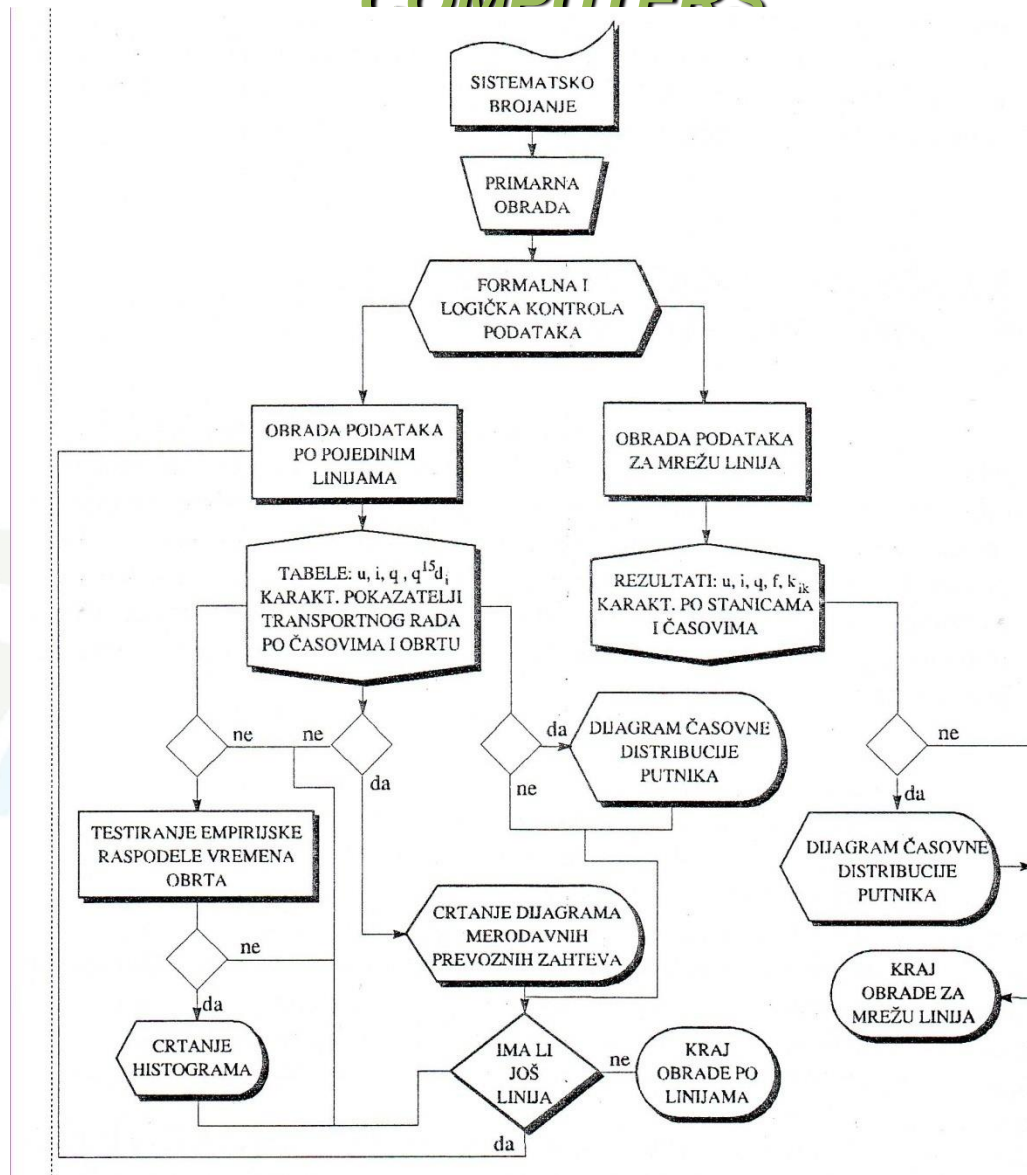
Characteristics of a heterogeneous fleet

Inter-stop distances by stations in both directions

Station codes by direction

Data on passenger entries and exits related to a half-trip cycle.

3. DATA PROCESSING OF COUNTING RESULTS AND USE OF COMPUTERS



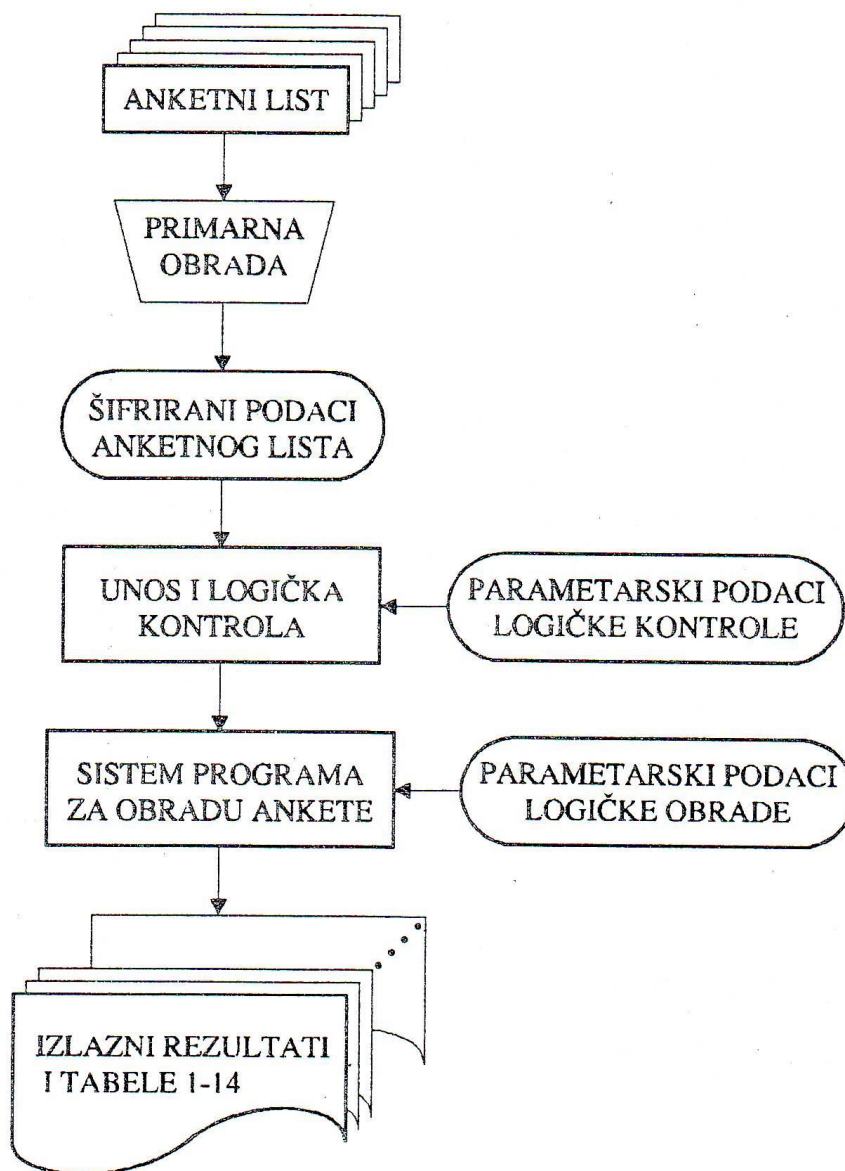
Algorithm for processing counting data using computers

4. SURVEY OF THE PT PASSANGERS

		anketno mesto linija datum čas(interval)
1.	POL	muški ☐ ženski ☐
2	STAROST	ispod 18. godina ☐ preko 18. godina ☐
3	ODAKLE STE DOŠLI NA STAJALIŠTE? adresa opština	
4	ŠTA STE TAMO RADILI? stanovanje ☐ kupovina ☐ zabava i rekreacija ☐ redovan rad ☐ školovanje ☐ ostalo ☐	
5	GDE ĆE TE ZAVRŠITI PUTOVANJE? adresa opština	
6	ŠTA ĆETE TAMO RADILI? stanovanje ☐ kupovina ☐ zabava i rekreacija ☐ redovan rad ☐ školovanje ☐ ostalo ☐	
7	KAKO STE DOŠLI NA OVU STANICU? peške ☐ autobusom ☐ ostalo ☐	
8	KOLIKO STE VREMENA UTROŠILI ZA DOLAZAK NA OVO STAJALIŠTE?	
9	DA LI NA OVOM STAJALIŠTU MENJATE LINIJU I KOJU?	
10	NA KOJI NAČIN PLAĆATE PREVOZ?	
11	KOLIKO AUTOMOBILA IMA VAŠE DOMAĆINSTVO? nijedan ☐ jedan ☐ dva i više ☐	
12	DA LI IMATE VOZAČKU DOZVOLU? da ☐ ne ☐	
13	DA LI STE IMALI MOGUĆNOST DA KORISTITE AUTOMOBIL ZA OVO PUTOVANJE? da ☐ ne ☐	
anketar		broj lista

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5. PROCESSING OF THE SURVEY ON A



Algorithm for computer processing of the survey

6. Changes in passenger transport volume over time

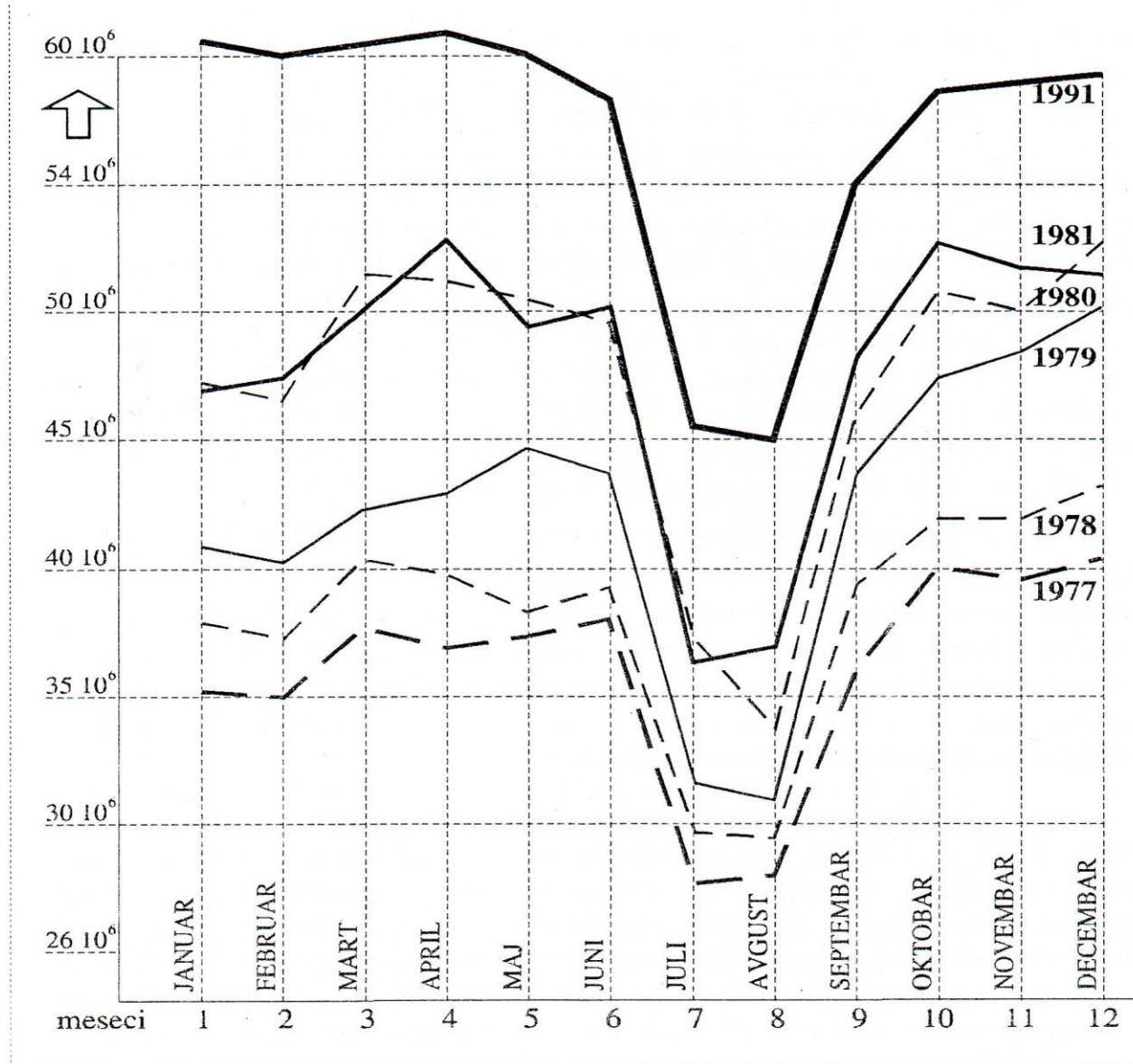
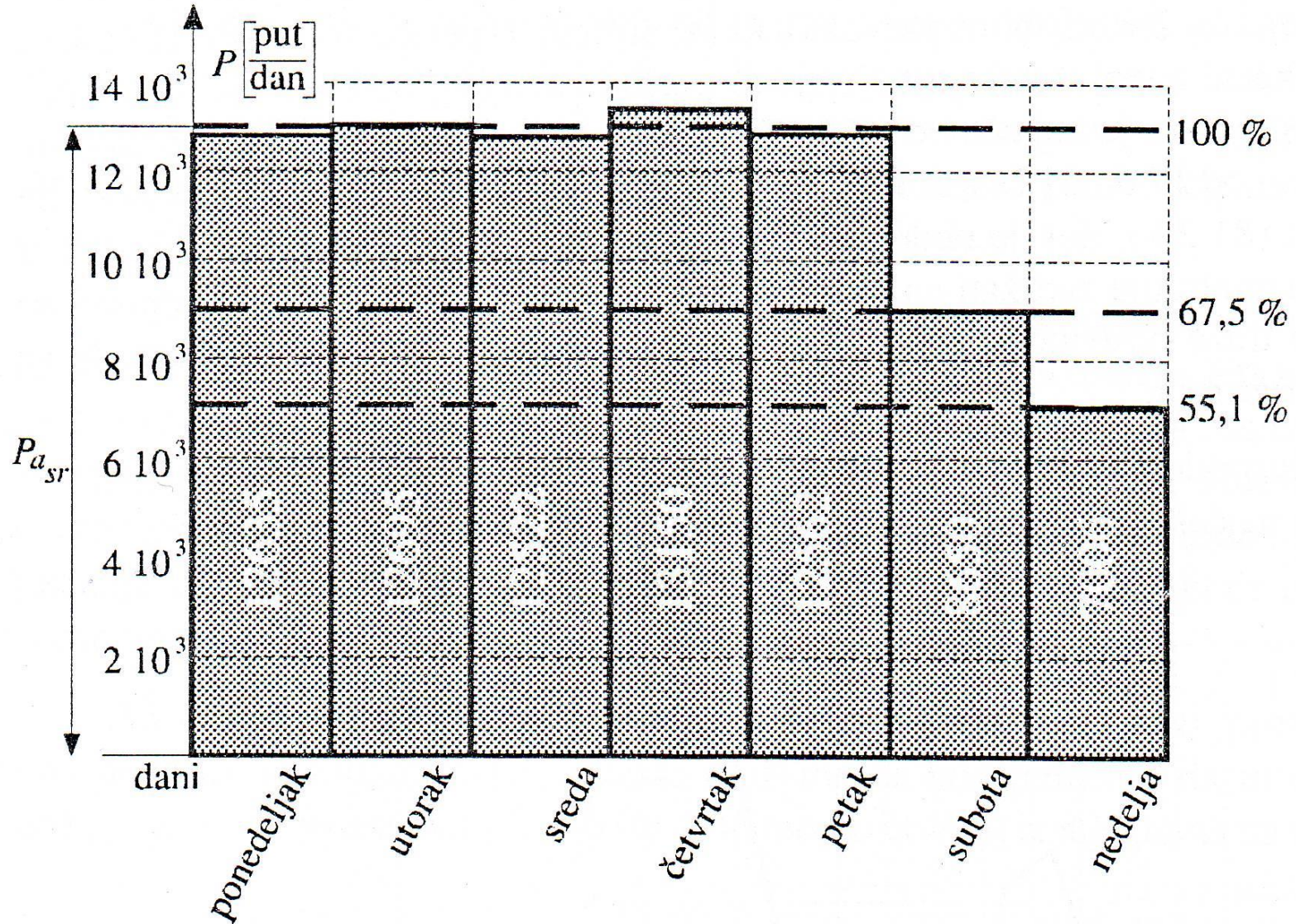


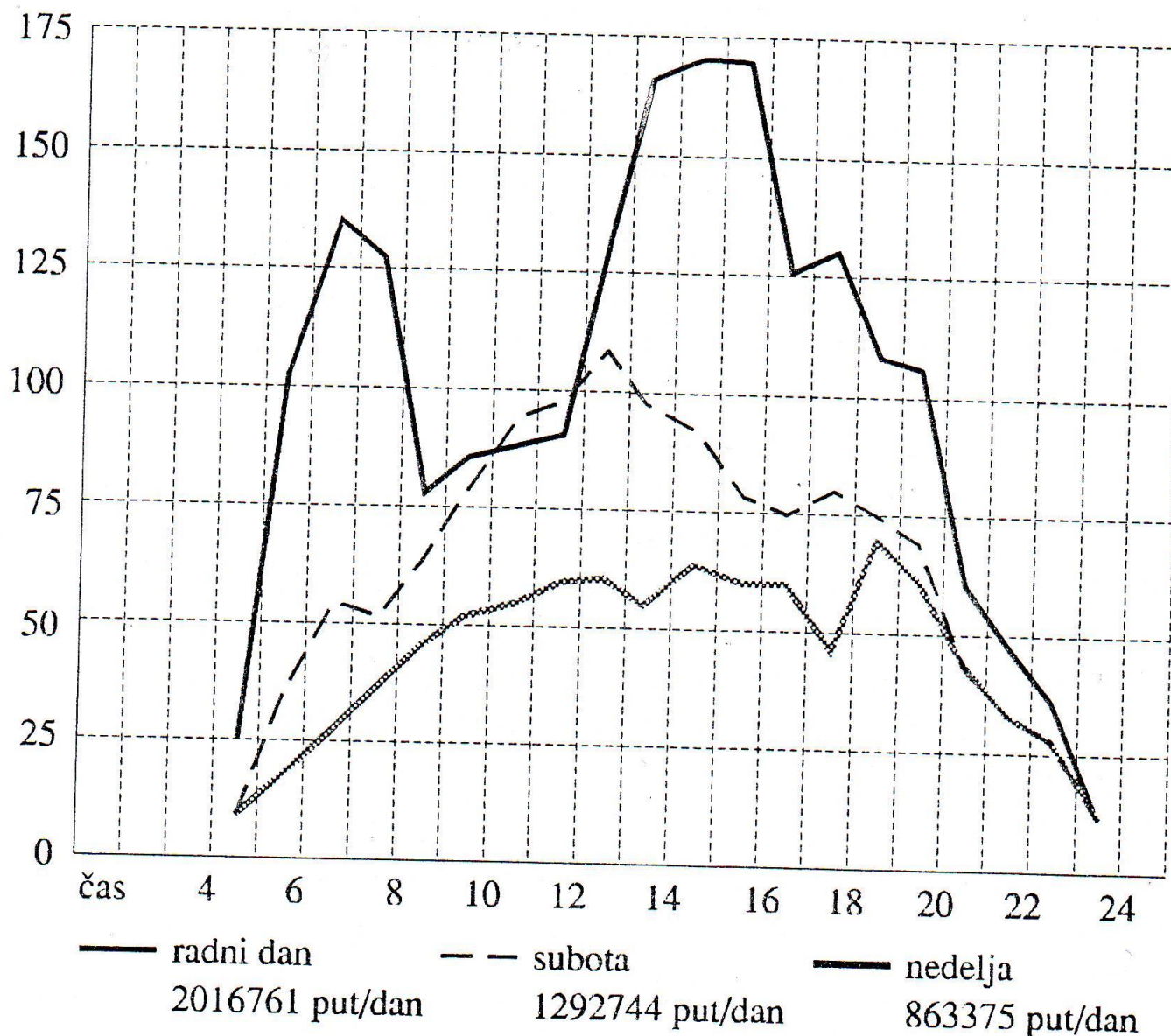
Diagram of the distribution of passenger transport volume by month in Belgrade

6. Changes in passenger transport volume over time



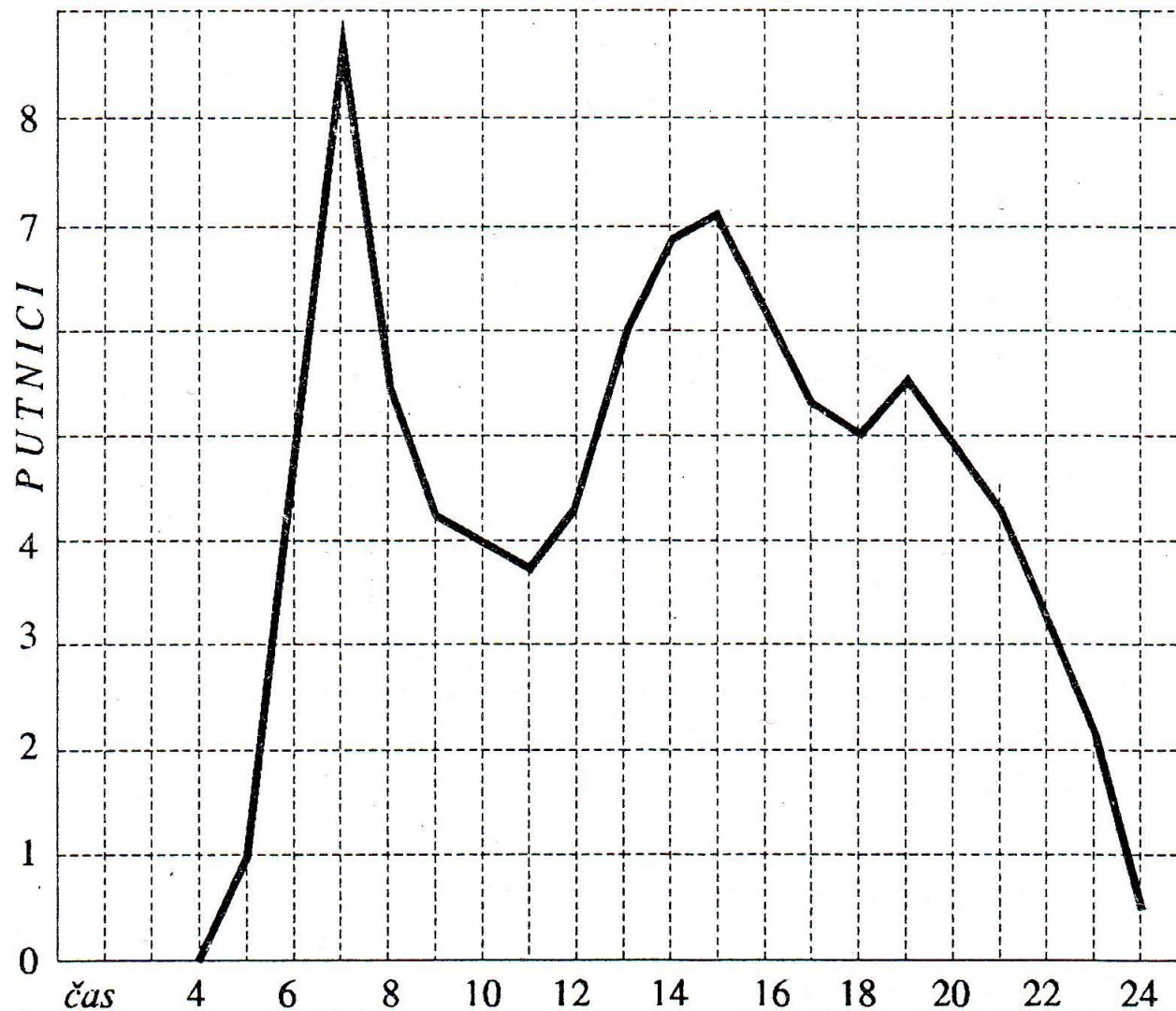
Variations in the transport volume during the days of a month

6. Changes in passenger transport volume over time



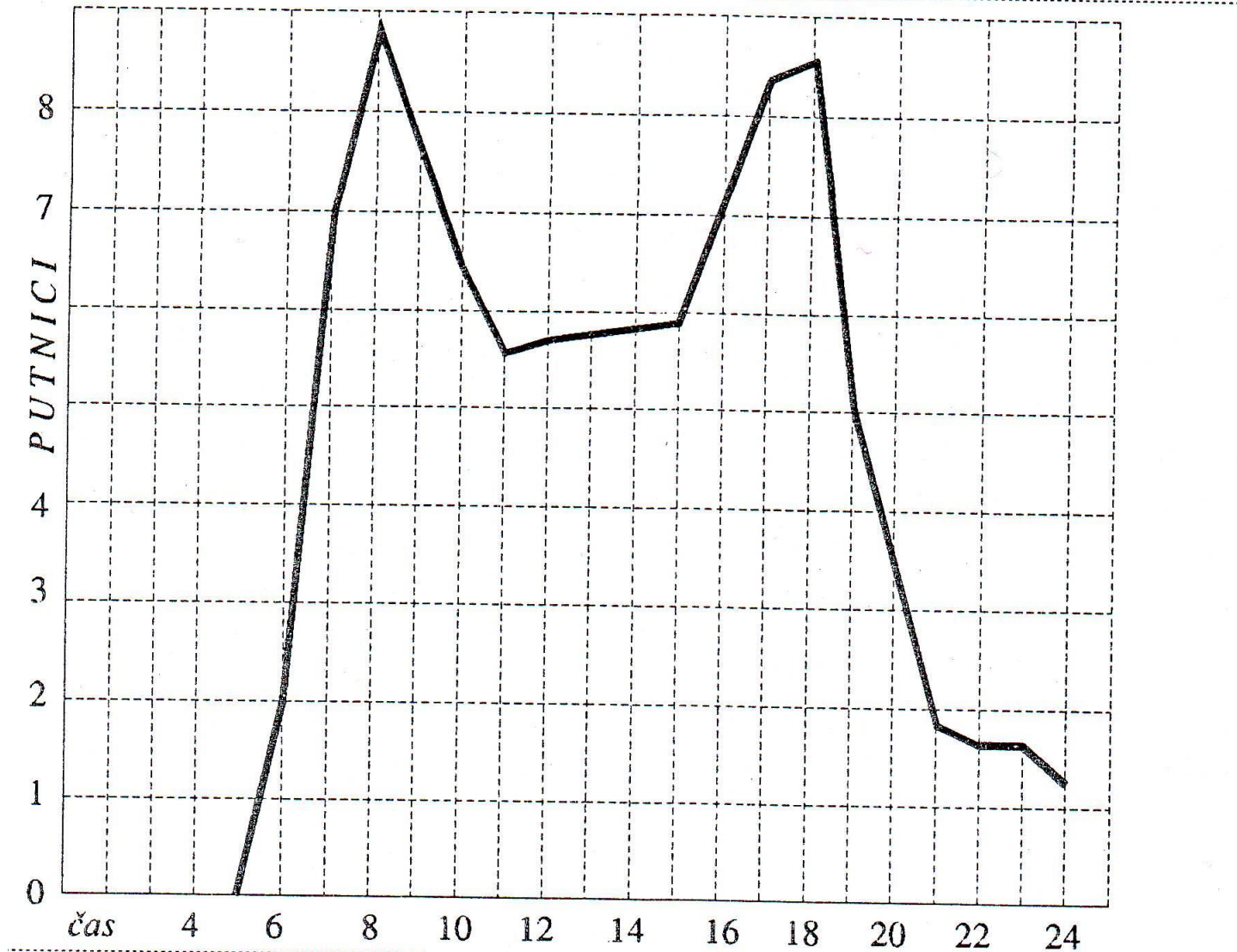
Distribution of transport volume by the hours during the day

6. ПРОМЕНЕ ОБИМА ПРЕВОЗА ПУТНИКА ПО ВРЕМЕНУ



Сл. 4 Најчешћа дистрибуција путника по часовима у току радног дана у нашим градовима

6. Changes in passenger transport volume over time



The most common distribution of passengers by hour during a working day in Western European cities