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INNOVATIONS IN EDUCATION, TECHNOLOGY AND APPLIED SCIENCES

Welcome to the inaugural issue of the International Journal of Education, Technology Research (IJOETR).

This premier issue, titled *"Innovations in Education, Technology and Applied Sciences,"* presents a diverse and carefully selected collection of peer-reviewed articles. It highlights the latest advancements across our core disciplines, bridging the gap between theoretical research and practical implementation.

In this issue, readers will find insightful contributions covering:

- Modern Educational Technologies (EdTech) and Digital Learning Environments.
- The Application of Artificial Intelligence in Information Systems.
- Innovative Approaches in Engineering Education.
- Applied Engineering Solutions, including Urban Technologies and Transport Optimization.

By bringing together interdisciplinary research, this inaugural issue aims to set a high standard for academic discourse and provide valuable, real-world solutions for researchers, educators, and industry professionals globally. We invite you to explore the articles and join us in advancing the frontiers of knowledge.

Добро пожаловать в первый выпуск Международного журнала исследований в области образования и технологий (IJOETR).

Этот главный выпуск, озаглавленный «Инновации в образовании, технологиях и прикладных науках», представляет собой разнообразную и тщательно отобранную коллекцию рецензируемых статей. Он освещает последние достижения в наших основных дисциплинах, преодолевая разрыв между теоретическими исследованиями и практическим применением.

В этом выпуске читатели найдут содержательные статьи, охватывающие следующие темы:

• Современные образовательные технологии (EdTech) и цифровые среды обучения.

• Применение искусственного интеллекта в информационных системах.

• Инновационные подходы в инженерном образовании.

• Прикладные инженерные решения, включая городские технологии и оптимизацию транспорта.

Объединяя междисциплинарные исследования, этот первый выпуск призван установить высокие стандарты академического дискурса и предоставить ценные, реальные решения для исследователей, преподавателей и специалистов отрасли по всему миру. Мы приглашаем вас ознакомиться со статьями и присоединиться к нам в продвижении границ знаний.

turlari bo‘yicha ulushi shahar transport tizimi rejasini takomillashtirishda asosiy parametr sifatida qaraladi.

Foydalanilgan adabiyotlar ro‘yxati

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ANALYSIS OF PROBLEMS OF POPULATION MOBILITY AND PROSPECTS OF DEVELOPMENT

prof. DSc. Abdunazarov Jamshid Nurmukhammadovich
Jizzakh polytechnic institute, Transport logistics department
Jamshid1986_86@list.ru

Nishonov Azizbek Orzikul ugli
Tashkent state transport university, PhD student,
nishonov_azizbek@list.ru

Abstract. When studying the mobility of the population, it is appropriate to organize PT activities that can fully satisfy the needs of the population by ensuring mobility using the most convenient type of transport for them or by determining which parts of the city have high mobility. . To fulfill this task, one of the main tasks is to determine in which areas of the city the population moves during the day and to organize the most convenient transport system for them.

Introduction. The study of passenger mobility in public transport (PT) is an important factor determining not only the volume of demand for transport, but also the quality of service in PT in the organization of the urban transport system. Through this indicator, the average distance traveled by passengers in PT, the transport work performed in PT, and the mobility of inter-station

passenger flow (PF) are studied. As a result, PT route network indicators, service quality and economic efficiency of routes are studied.

Research methods: Many foreign and domestic scientists have carried out scientific and practical work on improving the quality of passenger service and improving transport by studying the mobility of the population in PT. For example, Swiss scientists Alessio Daniele Marra and Francesco Corman carried out their scientific research work in Zurich to eliminate chaos by studying the factors affecting the quality of PT service. In their research, they investigated changes in bus timetables and their impact on PF based on GPS navigation tracking and Automatic Vehicle Location (AVL) program data of public transport operations.

Also, during the implementation of the research work, the scientific works carried out in the field in recent years, the analysis of the research works carried out on a global scale were also presented. In particular, the Dutch scientist Van der Hurk's 2015 research results on Passenger Flow in Public Transport Planning, Yongju Zhu and M.P. Goverde's 2019 Flexible Public Transport Timetable Planning Considering Passenger Flow , and the 2020 joint research by Kirishna Kumari and Van Lint in 2020, referring to the term "Public Transport" that the term "routes of use" has been changing in the last 10 years in the style of "transportation routes according to passenger mobility" and in solving the traffic problems arising in public transport, the main attention should be paid not only to public transport routes, rather, they justify the need to direct the flow of passengers to the directions of movement. Also, along with the study of passenger mobility, research on daily and seasonal mobility of the population plays an important role in public transport planning.[1] At this point, it should be noted that several other scientists, including Rahimi E., Shamshiripour A., Shabanpour R., Mohammadian A., have researched the disturbances in public transport and the impact of passengers on it. and analyzed the researches of a number of researchers such as J. Auld. [2].

"Multinomial logit model" method is used in the development of the model for the selection of an alternative route and the evaluation of disturbances in transport routes.

The most convenient bus route is selected for passengers, taking into account the situations of public transport disturbances that have occurred or are likely to occur. The mathematical model of choosing this route is defined as follows:

$$U_j = V_j + \varepsilon_j \quad (1),$$

$$V_j = -C_j = \beta_{tram} * tram + \beta_{bus} * bus + \beta_{train} * train + \beta_{walk} * walk + \beta_{tt} * transferTime + \beta_{transfers} * transfers \quad (2),$$

where V_j represents the structural component of the developed model, ε_j- represents the time lost as a result of confusion in choosing a route. *Tram, bus, train, and walk parameters* determine the time required for one complete movement of a passenger on the railway line. However, among

these indicators, only the movement of passengers inside the bus is considered, and the distance traveled by passengers to the bus stop and the time spent waiting for the bus they need at the stop are not taken into account. Therefore, in the research work, scientists determined the average time spent by passengers to reach their destination, and the average distances in movement, taking into account only the movements of passengers in public transport. The researchers identified the irregularities in the PT service process and developed measures to improve the PT activity by reducing the average time and distances lost in delivering passengers to their destinations.

Since our research is mainly in the field of road transport, we made a theoretical analysis of several indicators such as stopping distance, braking distance, and driver reaction time of passenger vehicles.

If we study the European experience in the study of population mobility, a group of scientists conducted studies on the study of population mobility in 5 cities of 3 countries: Copenhagen (Denmark), Gdynia and Wrocław (Poland), Stuttgart and Ulm (Germany). went In studying the mobility of the population, together with the government, a committee of researchers, practitioners and social volunteers, they conducted surveys across the cities and found out what type of transport the majority of the population uses to visit the next destinations in the cities. Through this, they determined the number and types of transport that are most needed in the cities during the day, and determined the amount of PT, bicycle and car taxis offered according to the demand of the population. Through this, a plan for ensuring sustainable urban mobility (SUMP) was formed in cities based on the demand of the population. As a result, the number of private car (PC) users decreased, and the number of pedestrians, bicycles and pedestrians increased significantly (Table 1). [3].

Table 1

Indicators for evaluating the efficiency of population mobility across cities

Indicator	City	Preliminary indicator	The indicator has changed in recent years
Vehicleization indicator (passenger vehicle/1000 people)	Copenhagen	224 (2010)	195 (2014)
	Stuttgart	453 (2010)	484 (2020)
	Gdynia	542 (2015)	628 (2018)
	Wroclaw	524 (2011)	689 (2018)
Share by type of transport (proportion	Copenhagen (2010)	Bicycle: 33%	Bicycle: 35%
		PT: 27%	PT: 29%
		ShA: 40%	ShA: 37%

according to types of transport)	Stuttgart (2010)	Bicycle: 5%	Bicycle: 8%
		On foot: 26%	On foot: 29%
		PT: 24%	PT: 27%
		ShA: 45%	ShA: 40%
	Ulm	Bicycle:11,4%	Bicycle:12%
		On foot: 23,3%	On foot: 30%
		PT: 15,5%	PT: 17%
		ShA: 49,8%	ShA: 45%
	Gdynia	Bicycle:1,8%	Bicycle:2,1%
		PT: 34,8%	PT: 37,1%
		ShA: 57,8%	ShA: 49,4%
		Other: 0,5%	On foot: 11,4%
	Wroclaw	Bicycle:6,3%	Bicycle: 8,4%
		On foot:24,2%	On foot: 26,7%
		PT: 27,6%	PT: 32,4%
		ShA: 41,4%	ShA: 31,5%
		Other: 0,5%	Other: 1,5%
Users of PT	Copenhagen (The number of bicycle users has changed compared to 2011)	Bicycle: 2% (2014)	Delivering 20% by 2025
	Stuttgart (one day railway, bus passengers)	Railway: 416000 (2016)	Railway: 500,000 (2018)
		Bus: 179000 (2016)	Bus: 186000 (2018)
	Wroclaw (Public transport passengers - annual)	207 mln. (2018)	209,6 mln. (2019) 121,3 mln. (2020)

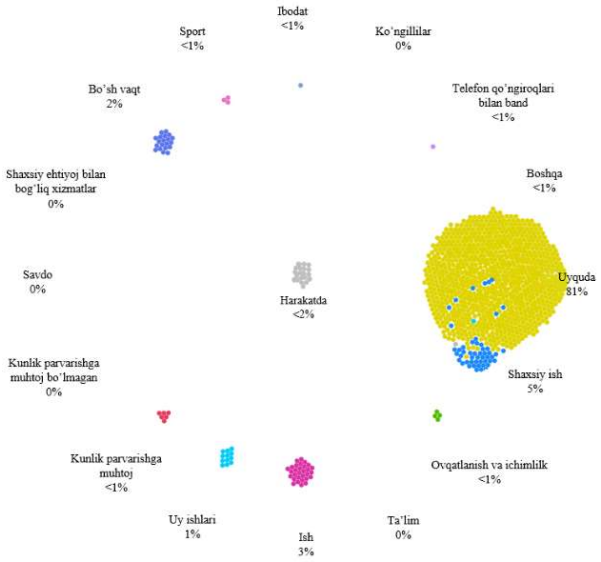
It should be noted that Moscow scientists Mikhail Yakimov and Vasiliy Sai, by studying the mobility of the population in PT in cities, determined parameters such as the total and average travel distance of passengers and buses during the day, average speed of movement, time at work conducted research on research. These studies help to determine not only the amount of demand for PT in the transport system, but also indicators such as the quality of PT service in large cities.

Also, these indicators characterize the quality of PT network planning in cities and economic efficiency indicators of PT routes.

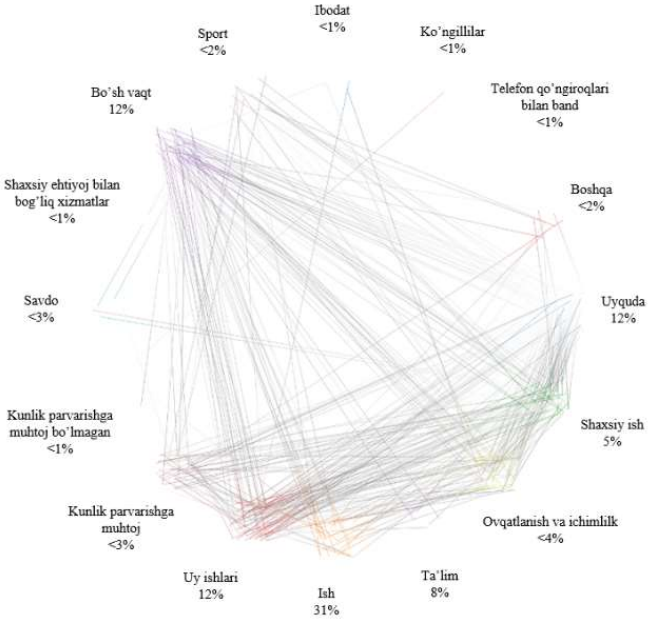
In the course of this research, the scientists took into account the distribution of the flow of passengers on the bus routes by the number of available stops, the average walking distance of passengers, the average time spent on movement, and calculating the completed transport work, Kurgan, They compared and studied the results of the experiment obtained in the cities of Izhevsk, Berezhniki, and Semferopol.

Many scientific researches have been carried out in the United States of America (USA) on the development of public transport activities. For example, Nathan Yau, an American statistician and big data visualization specialist, has conducted research on population mobility in the United States, and the goal of his research is to analyze population mobility in cities according to their mobility goals. did In this regard, the organization for conducting surveys among the population in the USA worked together with the company "American Time Use Survey" and researched mobility according to the daily needs of the population according to the directions of the visitor's addresses, in which part of the day exactly in the city conducted research on which areas the traffic load will increase. [4].

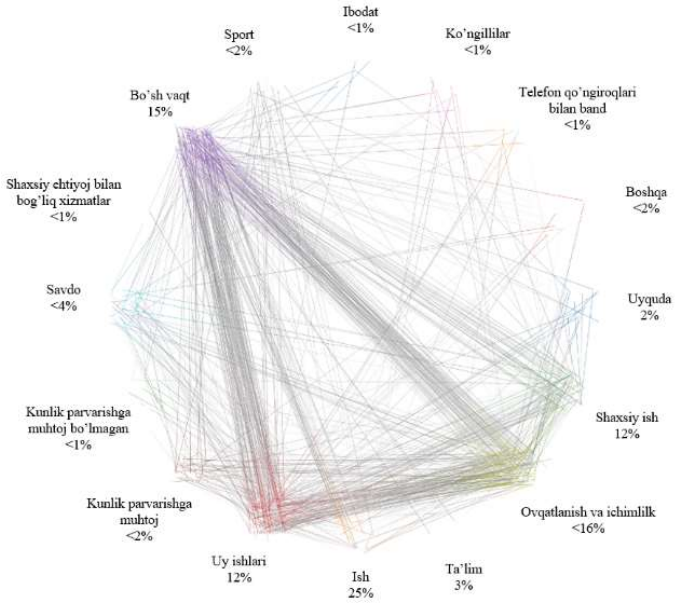
According to this research, the scientist identified the main 16 reasons for the mobility of the population, and by determining their mobility according to the busiest hours of the day, he developed proposals for improving PT activities in these directions (Fig. 1). According to the results of the conducted research, 81% of the population was asleep by 06:00 a.m., and during the next 3 hours, this indicator is mainly based on indicators such as work, education, and household chores. changes according to If we take into account that the population usually goes to work or study at this time, it will be possible to determine to which areas of the city mobility will increase through the personal information of the participants of the survey. In the same order, between 11:00 and 14:00, mobility mainly occurs around meals, work, and use of free time for personal affairs. If we focus on the mobility between 18:00 and 22:00, we can see that the main part of the population is late to their home addresses, busy with personal work and using free time. [4].



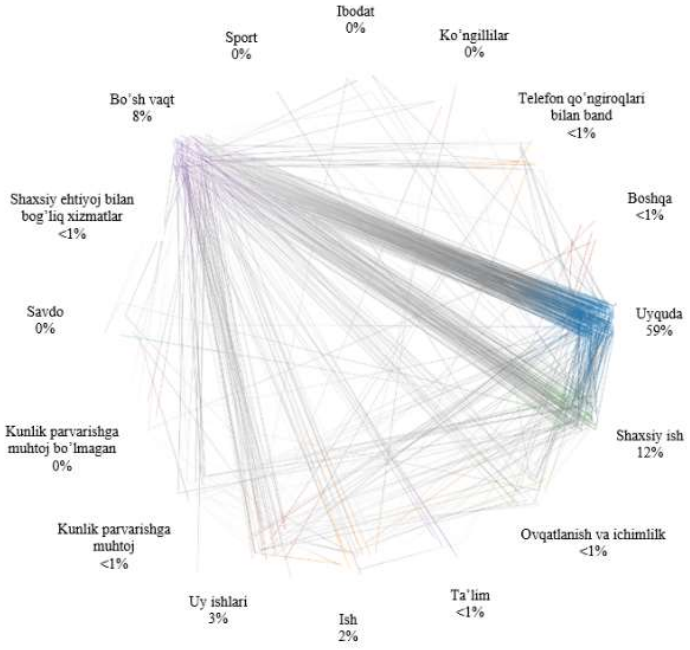
a) Factors creating population mobility (population employment as of 06:00)



b) Mobility graph between 06:00-09:00



c) Mobility graph between 11:00 and 14:00



d) Traffic schedule between 18:00-22:00

Figure 1. Population Mobility by Daily Purpose (US). a) Population mobility factors (as of 06:00) b) Mobility graph between 06:00-09:00 c) Mobility graph between 11:00-14:00 d) Time Traffic graph between 18:00-22:00 [4]

A lot of advanced scientific and practical works have been carried out on improving PT activities and thereby developing the transport system in cities by researching population mobility. In particular, in the USA and Europe, they determined for what purposes the population uses transport in cities and what level of movement speed can occur in cities through this. This, in turn, was accepted as a key indicator in planning and organizing PT activities. Nevertheless, according to the results of the research analyzed above, the mobility of the population is mainly based on the

number of visits that may occur according to their daily needs. However, according to the review of the literature analyzed above, it is not shown that the addresses that can be visited by residents are located in more than one part of the city, and it is not shown that a more optimal solution can be found by using several types of transport in the organization of PT activities. Also, there are no specific developments in the research work on which addresses of the city (according to the coordinates on the map) they will visit. In this way, during the implementation of this research work, it was determined which addresses of the city (according to the coordinates on the map) that residents visit during the day, and proposals for improvement were developed by organizing PT activities..

Conclusion. When analyzing the studies conducted on the improvement of the PT activity, according to the research conducted jointly by the scientists of the Moscow Transport Academy of the Russian Federation and the Russian Ural Railway Transport University, the average distance traveled by the population in the PT, it was found that researches were conducted to improve the performance of PT in terms of indicators such as the time spent to cover this distance and the transport work performed in delivering passengers to their destinations. When the methods of this research work were studied, they mainly determined the passenger flow according to the parameters of the average time spent, distance and performed transport works according to the mobility of the intermediate stations. As we know, a passenger can board PT at any station and get off at any station. Also, the population moves using the vehicle of their choice. When using a private car, taxi, motorcycle or bicycle, there is no need for a stop for the traveler. Therefore, when studying the mobility of the population, it is advisable to ensure mobility using the most convenient type of transport for them, or to organize PT activities that can fully satisfy the needs of the population by determining which parts of the city have high mobility. In order to fulfill this task, one of the main tasks is to determine which areas of the city the population moves during the day and to organize the most convenient transport system for them.

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