Chapter 5
Urban Mobility Solutions as a Sociotechnical System

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ABSTRACT

The efficiency of urban mobility systems significantly depends on the following factors: what technical and technological solutions are used in the system, how the interaction of all system participants is organized and what is the main motivation of the system users. This means that when analyzing urban mobility systems, it is necessary to use a socio-technical approach. The work is based on cases of integrating sustainable transport solutions of Peter the Great St. Petersburg Polytechnic University (SPbPU) into the urban transport system of St. Petersburg. Following the socio-technical approach, the chapter presents the results of the analysis of the technical and technological subsystem of the corporate transport system with an emphasis on the infrastructure necessary to support various innovative solutions in the transport sector.

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INTRODUCTION

The development of modern society is based on the inextricable connection of science, technology, economics and the social sphere. Urbanization has led to the fact that cities play a key role in this process. This is reflected in the concept of a "smart city", which has become extremely popular over the past few years and is used both in scientific literature and in numerous marketing publications. This fully applies to the concept of mobility. Urban mobility is becoming increasingly "smart", transforming itself in the direction of creating a comfortable, sustainable, greener and safer urban environment for residents. Thanks to innovations that radically change not only the properties and capabilities of individual vehicles, but also the methods of managing urban infrastructure as a whole, it becomes possible to create a sustainable and effective system of "smart" urban mobility in cities that will meet the changing needs and preferences of residents in the field of mobility. The development of innovative technologies and scientific consensus on the impact of anthropogenic factors on the degradation of the human environment, as well as the political goals of ensuring energy security and global energy competition, have generated numerous discussions on the need to accelerate and transform existing urban mobility systems (Moser, 2021; Bylinko, 2024). Modern trends in digitalization and the development of cyber-physical systems in the transport sector have led to the rapid development of concepts of "smart" urban mobility systems. It is generally recognized that the implementation of "smart" urban mobility systems can provide a number of positive results, including environmental benefits (reduced air and noise pollution in the urban environment), economic benefits (reduced costs of transporting passengers and goods, as well as repair and maintenance of vehicles, optimized use and reduced consumption of energy and fuel), social benefits (increased safety, comfort and speed of travel, increased attractiveness of urban spaces, reduced negative impact of vehicle exhaust gases on health) (Szpilko et al, 2023). The practical implementation of these opportunities requires a radical restructuring of the urban transport infrastructure. The main driving forces behind this restructuring are the following phenomena (Rodrigues, 2024).

Concentration of Population in Large Cities

Currently, more than half the world's population lives in cities, and according to World Bank forecasts, comparing to 2017, the urban population is expected to more than double by 2050 (The World Bank, 2017). The process of concentration of population in large cities leads to the growth of urban territory and the densification of its use, which requires an increase in investment in transport infrastructure, while the construction of new and maintenance of existing infrastructure becomes