令和３年度 環境科学院 修士論文内容の要旨

Spatial characteristics of public bus service in urban Sapporo

（札幌における路線バスサービスの空間的特性）

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The service capacity of urban public transportation is an important measure for the sustainable development of a city, especially regarding its irreplaceable role in solving the problems in urban greenhouse gas emissions and urban traffic congestion. In recent years, the current situation of public transportation in Sapporo has been analyzed from two aspects: social and economic benefits and environmental protection. From the perspective of economic benefits, Sapporo is facing the problem of population decline and aging. At the same time, as the tourist center of Hokkaido, Sapporo needs to provide tourists with good accessibility and travel environment; from the perspective of environmental protection, the main greenhouse emissions of carbon dioxide are still increasing, partly due to inefficient traffics. In order to better carry out urban construction and facilitate residents' travel, this article aims to study the spatial characteristics of the public transportation system in Sapporo, using the number of point of interests (POIs) around bus stops, the population of residents served by bus stops, and the average use of POIs from bus stops to nearby POIs. These three aspects are analyzed using the broken line type nondimensionalization and AHP (Analytic Hierarchy Process), and the final comprehensive evaluation index is comprehensively calculated. The results show that on an overall point of view, the stops with good public transportation service capacity are evenly distributed in the city of Sapporo, indicating that the overall public transport service capacity of Sapporo is served in a good manner without biased high concentration in the city center. From a small-scale perspective, some of them are distributed radially, which means each stop with a high service capability shows a spatial trend that takes itself as the center and radiates out to the surrounding areas, and the service capacity of bus stops decreases from the most central station to the outside. This distribution way is like some commercial centers in the city where the commercial vitality of a certain point drives the urban vitality of the nearby area; Others present a scattered checkerboard-like distribution. This distribution pattern is partly shaped by topographical factors or the presence of other modes of transportation in the area, and partly by a low integrated index due to an insufficient number of POI types or relatively long arrival times, which are areas that should be improved. These results can provide some significant suggestions to the urban plan decision-makers. Finally, by combining the integrated service capacity index map of urban Sapporo, this study discussed some advantages and future challenges of bus system from current situation of Sapporo public transportation, regarding seasonal variations, natural disaster problems, and cooperation between different systems of public transportations in Sapporo.