

## Evaluation of Kabul BRT Route Network with Application of Integrated Land-use and Transportation Model

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**Abstract :** The four decades of war, lack of job opportunities, poverty, lack of services, and natural disasters in different provinces of Afghanistan have contributed to a rapid increase in the population of Kabul, the capital city of Afghanistan. Population census has not been conducted since 1979, the first and last population census in Afghanistan. However, according to population estimations by Afghan authorities, the population of Kabul has been estimated at more than 4 million people, whereas the city was designed for two million people. Although the major transport mode of Kabul residents is public transport, responsible authorities within the country failed to supply the required means of transportation systems for the city. Besides, informal resettlement, lack of intersection control devices, presence of illegal vendors on streets, presence of illegal and unstandardized on-street parking and bus stops, driver's unprofessional behavior, weak traffic law enforcement, and blocked roads and sidewalks have contributed to the extreme traffic congestion of Kabul. In 2018, the government of Afghanistan approved the Kabul city Urban Design Framework (KUDF), a vision towards the future of Kabul, which provides strategies and design guidance at different scales to direct urban development. Considering traffic congestion of the city and its budget limitations, the KUDF proposes a BRT route network with seven lines to reduce the traffic congestion, and it is said to facilitate more than 50% of Kabul population to benefit from this service. Based on the KUDF, it is planned to increase the BRT mode share from 0% to 17% and later to 30% in medium and long-term planning scenarios, respectively. Therefore, a detailed research study is needed to evaluate the proposed system before the implementation stage starts. The integrated land-use transport model is an effective tool to evaluate the Kabul BRT because of its future assessment capabilities that take into account the interaction between land use and transportation. This research aims to analyze and evaluate the proposed BRT route network with the application of an integrated land-use and transportation model. The research estimates the population distribution and travel behavior of Kabul within small boundary scales. The actual road network and land-use detailed data of the city are used to perform the analysis. The BRT corridors are evaluated not only considering its impacts on the spatial interactions in the city's transportation system but also on the spatial developments. Therefore, the BRT are evaluated with the scenarios of improving the Kabul transportation system based on the distribution of land-use or spatial developments, planned development typology and population distribution of the city. The impacts of the new improved transport system on the BRT network are analyzed and the BRT network is evaluated accordingly. In addition, the research also focuses on the spatial accessibility of BRT stops, corridors, and BRT line beneficiaries, and each BRT stop and corridor are evaluated in terms of both access and geographic coverage, as well.

**Keywords :** accessibility, BRT, integrated land-use and transport model, travel behavior, spatial development

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