Cost-benefit analysis of road-underground co-modality strategies for sustainable city logistics (Postprint)

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Abstract

New-type urbanization necessitates smart, green, and efficient logistics systems to meet growing mobility demand. This paper explores the road-underground co-modality for urban freight transport (RUM4UFT) as a solution to urban traffic challenges, which includes three modal split strategies: mixed-use metro lines, metro freight-passenger integration, and purpose-built underground corridors. A monetized cost-benefit analysis (CBA) model is developed to evaluate the major costs of RUM4UFT and the accompanied benefits in transportation, ecological, and logistics economics from the perspectives of the public sectors and logistics service providers. Taking the Beijing Municipal Administrative Center as a case study, the CBA model demonstrates the advantages of RUM4UFT in promoting social and environmental sustainability, with the purpose-built underground corridor offering the highest long-term investment value. The findings provide valuable insights for advancing city logistics performance through underground transport initiatives.

Full Text

Cost-Benefit Analysis of Road-Underground Co-Modality Strategies for Sustainable City Logistics

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Abstract

New-type urbanization necessitates smart, green, and efficient logistics systems to meet growing mobility demands. This paper explores road-underground co-modality for urban freight transport (RUM4UFT) as a solution to urban traffic

challenges, encompassing three modal split strategies: mixed-use metro lines, metro freight-passenger integration, and purpose-built underground corridors. A monetized cost-benefit analysis (CBA) model is developed to evaluate the major costs of RUM4UFT and its accompanying benefits in transportation, ecological, and logistics economics from the perspectives of public sectors and logistics service providers. Using Beijing Municipal Administrative Center as a case study, the CBA model demonstrates the advantages of RUM4UFT in promoting social and environmental sustainability, with the purpose-built underground corridor offering the highest long-term investment value. These findings provide valuable insights for advancing city logistics performance through underground transport initiatives.

Keywords: City logistics; Co-modality; Cost-benefit analysis; Modal split; Underground freight transport

Note: Figure translations are in progress. See original paper for figures.