

## Transportation Analysis of Interconnectedness and Incident Accessibility of Highway Transportation Tunnels in Mountainous Regions: A Case Study in Antalya

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**Abstract** – Highway transportation tunnels play an essential role, particularly in geographically challenging terrains like mountainous regions, enhancing road accessibility for commuters. While these highway transportation tunnels offer significant time savings and ease of access, their construction demands meticulous planning and substantial investment. However, literature has largely overlooked the analysis of road transportation tunnel characteristics in relation to one another. To address this gap, a comprehensive analysis has been conducted based on the attributes of highway tunnels in the Antalya region. Data related to the aspects of the tunnels were collected for a very long time and accurately. Later, domain experts assessed these attributes to examine the data. Further, state-of-the-art metaheuristic techniques which are for solving complex transportation network issues when the traditional methods are too slow were employed in this study. Results indicate that the connectivity between highway transportation tunnels is remarkably low, and also transportation network connections between them need to be developed. Moreover, recommendations were provided for strategically locating emergency transportation assistance facilities along the road transportation network. This study significantly mitigates uncertainties in analysis methodologies and focuses on feasibility concerns in transportation applications.

*Keywords – Transportation Analysis, Transportation Network, Highway Tunnels, Connectivity*