

# **An Integrated Framework for Data-driven Transportation Infrastructure Planning**

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*The opinions expressed in this study represent those of the authors and are not necessarily those of the U.S. DOT.*

## **Abstract**

Transportation infrastructure planning is a complex process. Multitude of factors may affect transportation infrastructures. Due to the variety of data flowing in from all directions, be it online news sources, social media, technical documents, and many more, it is challenging to determine the comprehensive list of factors that may affect transportation infrastructures. There is a huge scope of these data sources for utilization in the transportation sector that can potentially improve the current practice of transportation infrastructure planning. Moreover, these factors may have complex coupling effects on transportation infrastructures and these relationships should be considered during the planning process. Currently, to the best of our knowledge, there lacks a structured framework that identifies the relevant factors and their inter-relationships in transportation infrastructure planning domain. The objective of this work is to initiate the development of an integrated structured framework that can help with long-term planning and decision-making of transportation infrastructure. To this end, topic modelling techniques (i.e., Latent Dirichlet Allocation (LDA) and Non-negative Matrix Factorization (NMF)) were implemented to extract important and emerging concepts related to transportation infrastructure planning from multiple sources [1]. Leveraging the important and emerging concepts, a taxonomy of transportation infrastructure planning was then developed. Association rule mining measures (i.e., Lift and confidence) were subsequently used to capture the inter-relationships as well as the association strength among relevant factors [2]. This framework can ultimately help decision makers and planners to have a holistic approach to plan, build, and manage our transportation infrastructures.

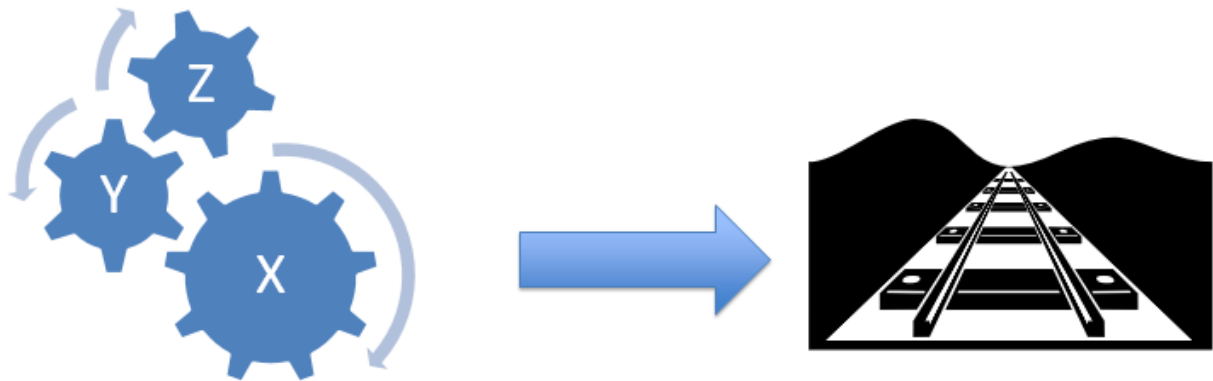


Figure 1. Coupling effect of factors on transportation infrastructures

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### References

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- [2] Abdel-Basset, M., Mohamed, M., Smarandache, F., & Chang, V. (2018). Neutrosophic association rule mining algorithm for big data analysis. *Symmetry*, 10(4), 106.