Deutsche Bahn regulations for tunnel construction
Creating a decision-making model to help evaluate and prioritize single-track and double-track tunnel design alternatives in the context of urban planning demands.

Summary
The worldwide trend is urbanization: more people live in cities than ever before. Unprecedented urbanization rates and the rapid development of metropolitan areas lead to the saturation of the existing infrastructure and superficial spaces as well as increasing demands on the transportation system. In pursuit of sustainable growth, many European cities are exploring possibilities of better utilizing underground space. This is especially relevant in terms of public rail transportation, which plays a critical role in the day to day life of city inhabitants. In Germany, the technical guideline that regulates the design, construction, and maintenance of railway tunnels fundamentally recommends the implementation of parallel single-track tunnels. Therefore, dual-track transverse sections, which usually present a lower impact on urban surface areas, are often neglected.

In order to encourage the consideration of both tunnel layouts during project planning phases, this study took into account particular advantages and disadvantages of each profile, regulatory technical standards and their influence on recent tunnel projects, as well as expert opinions from representatives of Deutsche Bahn AG to develop a decision model.

The proposed process consists of seven stages, among them a decision matrix, and has been applied to the current project of underground rail network expansion in Hamburg.

Finally, it has been proved that the model not only efficiently helps evaluating and prioritizing tunnel profile alternatives, but the contemplation and comparative analysis of both layout sections, furthermore, favors the identification of potential project performance improvements.