For decades researchers have claimed that particularly demand forecasts and construction cost estimations are assigned with/affected by a large degree of uncertainty. Massively, articles, research documents and reports agree that there exists a tendency towards underestimating the costs and overestimating the demand for transport infrastructure projects. It is therefore claimed that ex-ante evaluations of transport-related projects are often based on inaccurate material, which ultimately can lead to severe socio-economic misperformance. This paper seeks to bridge the gap between the inaccuracies in demand and cost estimations and hence the evaluation of transport infrastructure projects. Currently, research within this area is scarce and scattered with no common agreement on how to embed and operationalise the huge amount of empirical data that exist within the frame of Optimism Bias. Therefore, a full version of the UNITE-DSS model, which contains an integrated approach to socio-economic analysis, risk-based simulation and database information, will be presented. The procedure is based upon quantitative risk analysis and Monte Carlo simulation and conventional cost-benefit analysis converting deterministic benefit-cost ratios (BCRs) into stochastic interval results. A new data collection (2009–2013) forms the empirical basis for any risk simulation embedded within the so-called UP database (UNITE project database), revealing the inaccuracy of both construction costs and demand forecasts. Accordingly, the UNITE-DSS approach is therefore tested and further explored on a number of fixed case examples to investigate the performance and robustness of the traditional CBA results. Ultimately, a conclusion and perspectives of the further work will be set out.