CBA: Installation of speed humps

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ABSTRACT

A meta-analysis regarding the effects of the installation of speed humps on accidents (Høye, 2015) was revisited. The SafetyCube Economic Efficiency Evaluation (E3) Calculator was used. The resulting best estimate of the benefit-cost ratio (BCR) is 18.2 which means that the benefits tend to exceed the costs considerably. The BCR is sensitive to changes in the underlying assumptions as it is shown by the sensitivity analysis, however in all the scenarios it is shown that the installation of speed humps is a very cost-effective measure.

INPUT INFORMATION

Cases studied: The meta-analysis (Høye, 2015) reports a significant reduction of 17% (95% CI [-25%; -8%] of all crashes, as an effect of the implementation of speed humps. A case study on speed humps installation (49 speed humps) in one municipality of Athens, Greece is considered as regards the unit of implementation and the related costs (Yannis et al., 2005).

Crash costs: The updated SafetyCube estimates for 2015 for Europe were used (see SafetyCube Deliverable 3.2)

Measure Costs: The Greek case study reports a total cost of 187,953 EUR (converted from 1998 estimate for Greece to the 2015 value for EU-28), i.e. 3,836 EUR/speed hump. In the Handbook of Road Safety (Elvik, Hoye, Vaa, & Sorensen, 2009) a very similar value of 3,189 EUR /speed hump is reported (after related conversion from NOK 1996).

Time horizon: 25 years was assumed to be the time horizon for speed humps

Area/Unit of implementation: The example of 49 speed humps installation in one municipality of Athens, Greece is used (Yannis et al. 2005), and hence one (1) unit of implementation (1 municipality) was taken into account.

Number of cases affected: According to Yannis et al. (2005), the annual number of crashes with casualties in the examined municipality is 9 crashes (i.e. 0.184 crashes per speed hump).

RESULTS

Table 1 provides the input values and the result estimated benefit-to-cost ratio for speed humps for both studies. For the best estimate scenario the cost-benefit ratio was estimated at 18.2. This means that the benefits tend to exceed the costs considerably.

Table 1 Input values and B/C ratio for the 'best estimate' scenario

Scenario	Input values	B/C ratio
Best estimate	Accidents(fatal,serious,slight) reduction: 17% Implementation cost: 3,836 EUR /speed hump	18.2

SENSITIVITY ANALYSIS

We used the upper and lower limits of the effectiveness figures provided in the meta-analysis of (Høye, 2015) to run a sensitivity analysis. The values represent a (much) lower than expected and a (much) higher than expected effect respectively. Subsequently the effect is calculated for cases in which the measure costs are lower of or higher than estimated. Table 2 presents the results.

Table 2 Sensitivity analyses

Scenario	Input values	B/C ratio
Low measure effect	Impl. cost: 3,836 EUR /speed hump Accidents(fatal,serious,slight) reduction: 8%	8.6
High measure effect	Impl. cost: 3,836 EUR /speed hump Accidents(fatal,serious,slight) reduction: 25%	26.8
Low measure cost (-50%)	Impl. cost: 1,918 EUR /speed hump Accidents(fatal,serious,slight) reduction: 17%	36.4
High measure cost (+100%)	Impl. cost: 7.672 EUR /speed hump Accidents(fatal,serious,slight) reduction: 17%	9.1

We define a 'worst case' scenario as a combination of a much worse than expected effect (i.e. the lower limit of the 95% CI) and a higher than expected measure cost (i.e. the highest value of estimated costs). Also an 'ideal case' scenario is defined which is a combination of a much better than expected effect (upper limit of the 95% CI) and a lower than expected measure cost (the lowest value of estimated costs). The results of the CBA for these scenarios are reflected in Table 3.

Table 3 CBA for worst case and ideal case scenarios

Combined Scenario	Input values	B/C ratio
Worst case	Impl. cost: 6,377 EUR /speed hump Accidents(fatal,serious,slight) reduction: 8%	4.3
Ideal case	Impl. cost: 1,918 EUR /speed hump Accidents(fatal,serious,slight) reduction: 25%	53.8

REFERENCES

Elvik, R., Hoye, A., Vaa, T., & Sorensen, M. (2009). *The handbook of road safety measures 2nd Edition*. Emerald Group Publishing Limited.

Høye, A. (2015). Physical measures for speed regulation. In *The Handbook of Road Safety Measures, Norwegian (online) version.* Retrieved from http://tsh.toi.no/index.html?22167

Yannis, G., Papadimitriou, E., & Evgenikos, P. (2005). COST-BENEFIT ASSESSMENT OF SELECTED ROAD SAFETY MEASURES IN GREECE. In *Road Safety on Four Continents: 13th International Conference*.

SUPPORTING INFORMATION

Literature Search

A systematic literature search was conducted in June 2017. The database 'Scopus' was used to identify papers that contained cost-related information related to installing speed humps to improve road safety. The search terms used to identify papers which investigated the effectiveness of installing speed humps as a safety measure (see SafetyCube D5.2) were again used in this literature search. However, additional search terms (i.e. variations of 'cost' and 'cost-benefit analysis') were included to narrow down the papers to include only those containing cost-related information.

From this search, nine papers were identified which included cost-related search terms. After further investigation of these papers, four were found to have potential cost-related data for installing speed humps. After attempting to input information into the SafetyCube cost calculator from these four papers, it was found that none of them had enough relevant data for inputting into the SafetyCube cost calculator to be able to obtain any results.

The data from the meta-analysis included in the measures synopsis for speed humps (Høye, 2015, also see SafetyCube D5.2) was also investigated for relevant cost information. It was found that this data could be inputted into the cost calculator to provide results for estimated benefit-to-cost ratios for installing speed humps. Therefore in total, one paper was identified which had relevant cost information for inputting into the SafetyCube cost calculator.