

Memo – SCBA Hämeentie

Subject	Social Cost Benefit Analysis - Hämeentie
Date	Amsterdam, 10-04-2020
Client	City of Helsinki (in context of CIVITAS HANDSHAKE)
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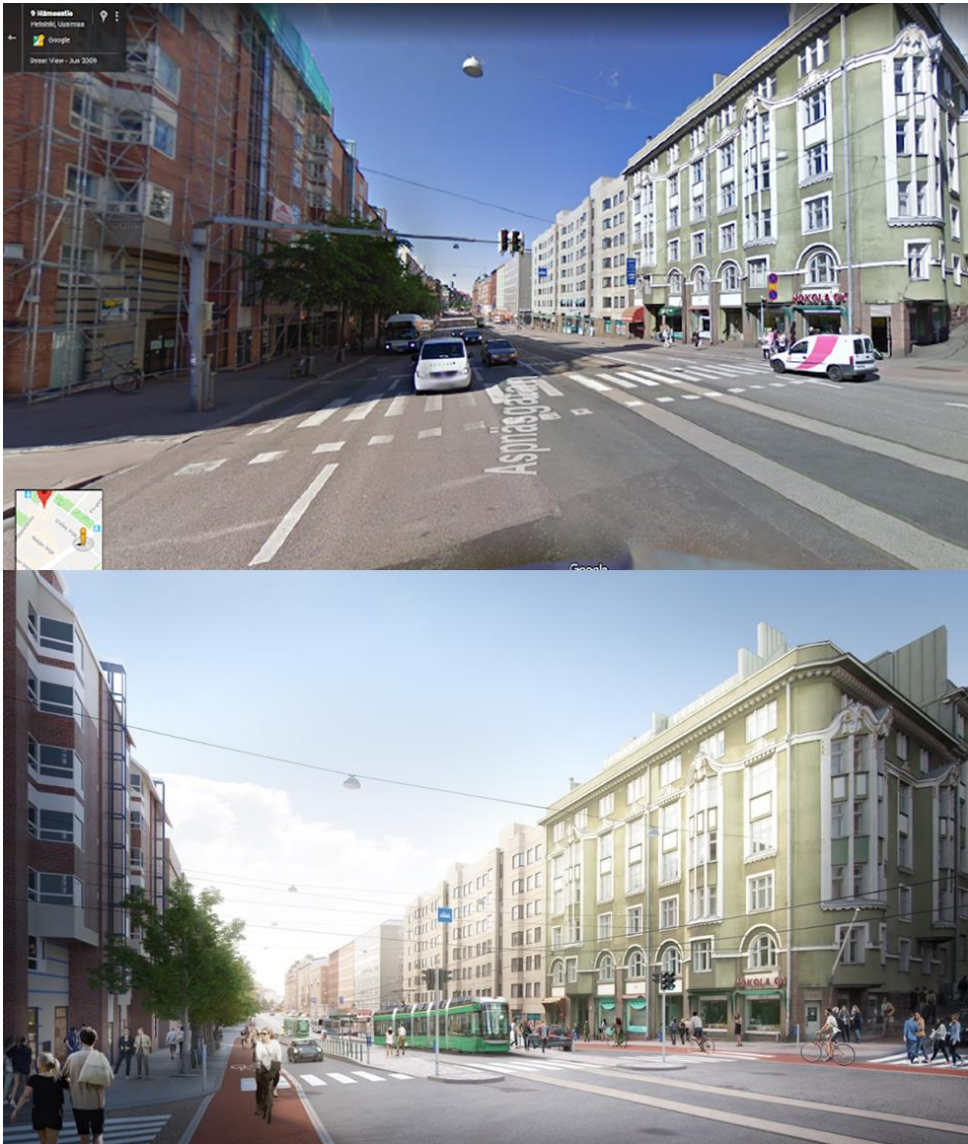
Introduction

In the European project *CIVITAS Handshake*, socio-economic evaluations are carried out for cycling solutions based on the concept of Bikenomics. This method combines standard welfare analysis techniques – such as social cost-benefit analysis and economic impact assessment – with other qualitative and quantitative methods to provide cities with a rational and holistic insights about the welfare effects and social impacts and provides local decision-makers and cycling leaders to the tools to test, optimise and justify cycling solutions in a rational way.

In this context a Social Cost Benefit Analysis (SCBA) of the redesign of the major thoroughfare Hämeentie was carried out for City of Helsinki. This document summarizes the work done and the results. The analysis is performed in a quick-scan manner. The inputs on the project were provided by City of Helsinki and not checked on quality by Decisio.

Project

Helsinki has a comprehensive network plan covering the entire city. The network consists of main routes (including bicycle superhighways), secondary routes and other routes, which mainly consist of traffic calmed streets. They need guidance and advice on systematically achieving high standards and quality in infrastructure design and implementation.



Effects

Helsinki expects that the number of cyclists on Hämeentie will increase from 200 to 2500 a day. The number of cars per day will be halved to 6000, and the number of pedestrians will remain the same. Because thru traffic is banned from Hämeentie, those cars will have to take a detour of 1km. Cyclists will be able to increase their speed from 14 km/h to 18 km/h. For Helsinki, the following effects were analysed:

- Investment and maintenance costs: Both investment and maintenance costs are known.

- Travel time: Because cyclists can cycle faster due to separated bike lanes, they experience time gains. Cars passing through Hämeentie now have to take a detour and experience a loss in time.
- Travel costs for cars: Since cars passing through Hämeentie are forced to drive a longer route, their costs to travel increase.
- Health effects: Because more people choose to cycle rather than drive, they experience positive effects on their health. Their productivity increases, health care costs are reduced, the burden of disease is reduced, and their life expectancy increases, which can all be valued positively.
- External effects: There is less congestion, noise, air pollution and climate emissions because there are less car trips. However, remaining cars have to take a longer route, which causes negative effects elsewhere. Overall there is a reduction in kilometres driven by cars, resulting in a positive effect.
- Safety effects. Safety effects occur because there is a reduction in cars on Hämeentie due to the modal shift towards cycling. It is expected that the number of accidents per year will be reduced to half, because car traffic is expected to be halved. Remaining cars taking a detour drive longer causing a higher risk on accidents elsewhere in the network. Overall there is a reduction in kilometres driven by cars, resulting in a positive effect on safety.

Discussion and further research needs

- Pedestrians or public transport passengers may also switch to cycling when Hämeentie becomes more bike friendly. These new cyclists will mainly experience a change in travel time and health benefits.
- Effects on the exploitation of public transport due to a modal shift in passengers.
- The comfort and the quality of public space for cyclists and pedestrians travelling on Hämeentie will be improved.
- The removal of parking space might increase the search time for a spot for cars. But on the other hand, there will be less cars in the street, cancelling out the effect.

Input

The inputs on the project used to perform the analysis are stated in the table below. These values were provided by City of Helsinki but not checked by Decisio.

Tabel 1 Inputs on project in SCBA Hämeentie

Parameter	Value
<i>Investment costs</i>	€ 9.352.230
<i>Year(s) of investment</i>	2019-2020
<i>Maintenance costs per year</i>	€ 190.000
<i>Number of cycling trips per year - before</i>	58.400
<i>Number of cycling trips per year - after</i>	788.400
<i>Number of car trips per year - before</i>	3.504.000
<i>Number of car trips per year - after</i>	1.752.000
<i>Modal shift from car to bike</i>	33%
<i>Modal shift from public transport to bike</i>	29%
<i>Modal shift from walking to bike</i>	33%
<i>Cars taking detour</i>	5.167
<i>Speed of cyclists (km/h)- before</i>	14
<i>Speed of cyclists (km/h) - after</i>	18
<i>Time savings for cars on Hämeentie (sec)</i>	- 28
<i>Length of project (km)</i>	1,4
<i>Investment costs</i>	€ 8.500.000
<i>Year(s) of investment</i>	2019-2020
<i>Maintenance costs per year</i>	€ 190.000
<i>Number of cycling trips per year - before</i>	58.400
<i>Number of cycling trips per year - after</i>	788.400

Source: City of Helsinki

Net Present Value (NPV)

One issue in comparing the costs and benefits is the difference in time in which the effects occur. The investment costs are incurred at the start of the project, while the benefits mainly occur afterwards. However, these benefits will occur for many years in the future. To be able to compare all effects, the net present value has been calculated. With this the future costs and benefits are calculated back to what they would be worth today using a discount rate. As a result, the current value of all future amounts is stated in one number and can be easily compared. For the determination of the net present value, assumptions have been made for the base year, the time period, the discount rate and the planning / phasing of the project.

We have used the following principles:

- The net present value (NPV) is calculated for the year 2018 at the start of the CIVITAS Handshake project;

- Effects are calculated for a period of 100 years from the start of construction. This corresponds to a theoretical "infinite" period, meaning that the solution is a permanent intervention;
- The discount rate used for the calculation is a constant rate of 4 percent;
- Monetary values are stated in 2019 price levels;
- All costs and benefits are expressed in market prices.

Results

The results are presented in table 2. Values are stated in net present value in 2018 at price level of 2019 and rounded to millions.

Tabel 2 Results SCBA Hämeentie

Results	NPV in 2018, in mln 2019 EUR
Financial effects	
Construction costs	- € 8,82
Maintenance costs	- € 4,30
Travel time effect	
Travel time for cyclists	€ 7,38
Travel time for cars	- € 5,92
Travel costs	- € 9,32
External effects	
Congestion	€ 14,53
Noise	€ 0,67
Air pollution	€ 0,57
Climate change	€ 1,79
Health	€ 36,81
Safety	€ 0,07
Qualitative	
Comfort	+PM
Public Space	+PM
Total costs	- € 13,1
Total benefits	€ 46,6 +PM
Balance	€ 33,5 +PM
B/C ratio	3,6

Interpretation of results

The final result of the analysis is a total sum of the costs (consisting of construction and maintenance cost) and benefits (all monetized effects) in net present value as

shown in table 2. The positive balance shows that the quantified benefits are higher than the costs. While the benefit-cost ratio (B/C-ratio) shows the magnitude of this relation. For example a ratio of 1.5 indicates that the benefits are 1.5 times as high as the costs. In other words: investing 1 euro in this project provides a return of 1.5 euro. The positive balance and B/C-ratio higher than 1 show that the project is a good investment in terms of quantifiable effects. Note that qualitatively assessed effects (such as comfort for cyclists and pedestrians and quality of public space) are not included in the stated result, but are important positive effects and should definitely be considered, making the SCBA even more positive. The SCBA provides a tool for policy-makers to make informed and rational decisions.

The SCBA results in a comparable value for all the effects. This offers the possibility to:

1. An integral assessment of various effects. All relevant costs and benefits of an investment project are considered and quantified as much as possible. Effects that cannot be expressed in money are listed separately. These effects remain outside the financial return figure but are described and included qualitatively.
2. Attention for the distribution of costs and benefits. Lead infrastructure projects like a bike lane network often cause inconvenience to some (e.g. motorized traffic and residents), while the benefits are initially for the users.
3. Comparing project alternatives. The social cost-benefit analysis is well suited for a systematical comparison of different project alternatives and to provide information regarding the trade-offs between alternatives.
4. Mapping uncertainties and risks. Different methods are used to take economic uncertainties and risks into account. The SCBA must support a policy decision based on a "calculated risk".

Sensitivity analysis

During the reconstruction of Hämeentie some renewal works will be done that would also have been performed without the redesign of Hämeentie such as the renewal of the sewage structure and bus stops. The costs for these works are not included in the SCBA, because they would be performed without the redesign of Hämeentie. However to be sure, we perform a sensitivity analysis with the total costs of reconstruction in order to see what the effect would be on the final result. For this we take the total construction costs of € 22.229.507.

Tabel 3 Results of sensitivity analysis on construction costs - SCBA Hämeentie

Results	NPV in 2018, in mln 2019 EUR
Financial effects	
Construction costs	- € 21,00
Maintenance costs	- € 4,30
Travel time effect	
Travel time for cyclists	€ 7,38
Travel time for cars	- € 5,92
Travel costs	- € 9,32
External effects	
Congestion	€ 14,53
Noise	€ 0,67
Air pollution	€ 0,57
Climate change	€ 1,79
Health	€ 36,81
Safety	€ 0,07
Qualitative	
Comfort	+PM
Public Space	+PM
Total costs	- € 25,3
Total benefits	€ 46,6 +PM
Balance	€ 21,3 +PM
B/C ratio	1,8