Economy and Guidelines

Cost-benefit ratio for noise abatement measures in Switzerland
Switzerland is beautiful ...
... and densely populated.
Noise pollution in Switzerland 2014

During daytime, every 5th is affected by noise levels above the legal limit values. At night, every 6th is affected.
Contents

Cost – benefit – effectiveness

1. Legal framework

2. Basic concept

3. Swiss shaping of the concept
Comprehensive legislation on traffic noise abatement since 1985 / 1987

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Legal framework – key points

- Noise abatements measures are part of every project for new roads or modifications of old roads since 1985.

- Old roads must comply with noise requirements and Government has set deadlines to meet these requirements (2018).

- Decisions on extent of measures in a project are taken by road authority on federal or cantonal level.

- Public and environment agency must be consulted.

- Neighbours of roads can challenge decisions in court.
Legal framework for roads, which are older than 1985

1st step
Preventive limitations «as much as technology allows» «economically acceptable»

2nd step
Stricter (more expensive) limitations to respect limit value; exceptions if measures are «disproportionate»

3rd step
Sound proof windows

Alarm value
Ambient limit value; threshold annoyance/health
Swiss guideline on cost-benefit ratio

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Swiss guideline on cost-benefit ratio
basic concept

- Calculate the external cost of noise of a given road perimeter → rough estimate

- Design a project (or several) for noise abatement and calculate the cost of the measures → cost

- See how external cost decreases with your projects → benefit

- Check how many people are protected by your projects → effectiveness
Swiss guideline on cost-benefit ratio cost

- building costs (barriers, pavements, …)
- maintenance costs
- Interest expenses
- (monitoring)

→ Based on **standardized costs**

→ Calculated as **annual charges**
Swiss guideline on cost-benefit ratio

Benefit of noise abatement measures

\[ \text{Benefit of noise abatement measures} = \text{Decrease of external costs due to noise abatement measures} \]
Swiss guideline on cost-benefit ratio
benefit – method to determine ext. costs established

External Costs and Benefits of Transport in Switzerland

Road, rail, air and waterborne transport from 2010 to 2013

FUNDAMENTAL POLICY QUESTIONS

Annual cost of noise: 1’900’000’000 CHF

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Swiss guideline on cost-benefit ratio
benefit – how to assess external costs

Noise causes physical and mental disturbance

Human health
Annoyance

Effect is measured by

Medical treatment expenses
Loss of production
Health related quality of life

Loss of real estate prices
Loss of rental prices
Cost for sound insulating measures

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Swiss guideline on cost-benefit ratio
benefit – external costs partly considered

Noise causes physical and mental disturbance

Medical treatment expenses
Loss of production
Health related quality of life

Human health

Annoyance

Loss of real estate prices
Loss of rental prices
Cost for sound insulating measures

costs considered in guideline
Swiss guideline on cost-benefit ratio

benefit – external costs

Noise levels at apartments exposed to road traffic noise *without* measures

Noise levels at apartments exposed to road traffic noise *with* measures

Average rental price of apartments

Reduction of rental price by dBA exceeding a threshold

External costs of noise *without* measures

External costs of noise *with* measures

**benefit**
Swiss guideline on cost-benefit ratio
Effectiveness

How many people will no longer be exposed to noise levels above the threshold, after the measures have been taken (in %)?
Swiss guideline on cost-benefit ratio

general index

\[
\text{Index} = \frac{\text{benefit}}{\text{cost}} \times \text{effectiveness}
\]
Swiss guideline on cost-benefit ratio
Swiss shaping of the index:

Index = \frac{\text{benefit}}{\text{cost}} \times \text{effectiveness} \quad 25

- Index > 4.0 very good
- Index > 2.0 good
- Index ≥ 1.0 sufficient
- Index < 1.0 insufficient
- Index < 0.5 bad

Measures are considered to be proportionate
Measures are considered to be disproportionate
Swiss guideline on cost-benefit ratio
Swiss shaping of the Index:

Efficiency (benefit/costs)

- 2m barrier
- 3m barrier
- 2m barrier + silent pavement

Effectiveness

- 100%
- 67%
- 33%
- 0%

- very good
- Good
- Sufficient
- insufficient
- bad
Swiss guideline on cost-benefit ratio

Swiss shaping of the Index:

- 2m barrier
- 3m barrier
- 2m barrier + silent pavement

Efficiency (benefit/costs)

Effectiveness

- very good
- Good
- Sufficient
- insufficient
- bad

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Questions?