Effects of Swedish Traffic Safety Research 1971-2004

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About VINNOVA

Mission: to promote sustainable growth by financing RTD and developing effective innovation systems in the fields of technology, transport and working life

Annual budget: Around 195 million euros

Number of employees: Around 180 persons

Instruments: R&D prgms, Centres of Excellence, institutes, SME schemes, international cooperation and others

Number of programmes running : Around 50

International cooperation
Policy makers need relevant information to underpin decision making.

Often long delay before full effects of research are visible.
Most ex post evaluations concluded shortly after end of programme.

Consequence: Full effects of funded research not analysed.

Ministry of Industry tells VINNOVA to perform impact analyses: 
“to describe impacts that have resulted from VINNOVA’s R&D-funding. Also comment on importance of used instruments for achieved impacts.”
Impact analysis – The context

Program

Before start of program – *ex ante*: Impact Logic Assessment

Chosen point of time, midterm or *ex post*: Evaluation

During course of program: Monitoring

Posterior measurement, often with respect to more than one program, and together with other and other’s efforts: Impact Analysis
VINNOVA’s impact analyses

4 pilot studies in 2001

6 impact analyses concluded

- Competence centre programme 1995 – 2003 8 years of perspective
- Impacts of neck injuries research 1985 – 2003 18 years
- User oriented ICT research 1982 – 1997 15 years
- Traffic safety research 1971 – 2004 33 years
- Role of R&D for Swedish mobile phone development 1975 - 2000 25 years
- Seed financing programmes 1992 – 2002 10 years

2 ongoing studies

- Impact from research in life sciences
- Research and innovation in Industrial Sector Programs
Number of killed in traffic 1970 – 2004

Note. Traffic volume increased from 37 to 77 billion vehicle kilometres in same period (208%).

Number killed per year

1307 killed

440 killed
Sweden successful as regards traffic safety

Traffic risk (killed per 100,000 vehicles)

Health risk (killed per 100,000 inhabitants)
### Traffic accident costs in 2005

<table>
<thead>
<tr>
<th>Degree of injury</th>
<th>Number in 2005</th>
<th>Costs per injury (M €)</th>
<th>Costs to society (M €)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Killed</td>
<td>440</td>
<td>1,90</td>
<td>840</td>
</tr>
<tr>
<td>Severe injuries</td>
<td>4 400</td>
<td>0,35</td>
<td>1 520</td>
</tr>
<tr>
<td>Injuries</td>
<td>44 000</td>
<td>0,02</td>
<td>840</td>
</tr>
<tr>
<td>Total</td>
<td></td>
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<td>3 200</td>
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Note 1 – costs according to SIKA 2005

Note 2 – statistics re. number of injured is incomplete. For each killed, 10 are assumed to be severely injured and 100 to be injured.
Why impact analysis?

Concern for position of behavioural sciences research

Intuitive belief that funded research was successful, need to understand if this was true and in which ways it was successful
How analysis was implemented

Initially unclear how to arrange a successful analysis
Exploratory interviews
Advisory group – particularly informed individuals
Early conclusion – focus on people (not e.g. money or projects)

Overview of all Swedish research 1949 – 2005

Selected evaluator team
Field competence: Norwegian Institute of Transport Economics (TÖI)
Synthesis of 1600 research articles on traffic safety measures,
incl. to what degree measures were based on research

Evaluation competence: Professor Arild Hervik, University of Molde

Step by step approach – 3 successive contracts
Important inputs from advisory group
Four dominating research environments

• Department of Applied Road Safety, Chalmers Institute of Technology
  - Safety systems for vehicles such as whiplash injuries, air bags, safety belts
  - 6,5 M €, 34 projects

• Department of technology and society, Lund Institute for Technology
  - Research on traffic environment in urban areas
  - 5,0 M €, 62 projects

• Department of Psychology, University of Uppsala
  - Research on human behaviour in traffic
  - 5,2 M €, 54 projects

• Swedish National Road and Transport Research Institute (VTI)
  - Technologies for roads and vehicles, tests, traffic economy, driver training etc
  - 11,7 M €, 105 projects
Impact analysis on three levels

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<tr>
<td>1973 – 2004</td>
<td>49 M €</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 + 21 M €</td>
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<thead>
<tr>
<th></th>
<th>CTH</th>
<th>LTH</th>
<th>UU</th>
<th>VTI</th>
<th>Others</th>
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<tbody>
<tr>
<td></td>
<td>6,5</td>
<td>5</td>
<td>5,2</td>
<td>11,7</td>
<td>21,2</td>
</tr>
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</table>

Case studies

Year 2000 price level
Summary – impacts of traffic safety research

VINNOVA and Council for Vehicle Research have contributed to:

- 481 lives saved annually – at a value of 920 M € -- and many traffic related injuries prevented (at an even higher value – appr x2)

- Swedish automotive industry has developed a considerable number of safety related products, of importance to the industry’s competitiveness

- Swedish research holds a high academic level in an international perspective

- Sweden has established university departments that trains qualified personnel in all domains of the traffic safety area – a Good Research Circle

- Effects on society’s way of thinking, in Sweden and in Europe

VINNOVAs and ffp:s financing crucial
Swedish Road Administration important in applying safety measures
Upstream approach

Impact on society
- reduced health care costs
- reduced loss of worktime
- reduced human pain

Impact on companies
- Increased sales

Impact on research
- Academic career

Importance of VINNOVA/PFF funding
Effect chain model

Public R&D financing

- Networks
- Uppsala - Lund – VTI - Chalmers

New knowledge

Academic impact
- Publications, conferences, PhD:s, patents etc
- Quantitative measurements

Impact at users
- Public users
  - R&D-based actions
  - Impact on traffic safety & accidents
  - Socio-economic analyses
- Private users
  - R&D-based actions in companies
  - Measurements of benefits
  - Importance of public funding
  - Socio-economic analyses

Diffusion of research in society
- General impact
- Mobility
- Raised competence
- Etc

- Qualitative measurements
- Networks
Contribution from research to increased traffic safety

Number killed per year

Fitted trend lines for numbers of killed in Sweden 1970 - 2005

Trend line for numbers killed without contribution of selected traffic safety measures

Large contribution from research = - 96

Some contribution from research = - 385

No contribution from research = - 70

Effects of traffic safety measures
Example – Neck injury research at Chalmers

*Fruitful interplay research - industry*

VINNOVA

Prgm on Vehicle Research (ffp)


45% safer cars regarding neck injuries
Network analysis

VINNOVA

Auto & Motorsport - 92

Volvo

Chalmers

EU FP

Sahlgrenska hospital

SAAB

PFF

whiplash research

Folksam research

Swedish National Road Administration

Swedish Defence Research Agency

Insurance Institute for Highway Safety

Auto & Motorsport - 92

Euro NCAP
Causes 65% of all disabling road traffic injuries

- 2000 people disabled annually
- 200 people early retreats annually, incl. younger persons

Injuring mechanisms still not fully understood

Occurs at low speed – e.g. peak hour accidents

Solution → find better vehicles – not a road environment issue

Worrying increase in number of injuries
Chalmers test equipment and applications - simple products based on advanced understanding

Chalmers BioRID test model

Autoliv/Volvo - WHIPS active whiplash protection

Autolivs YSAB – system for cars already in use

SAAB SAHR-system
Socio-economic impact

Volvo & SAAB cars 1998 - 165 M € Sweden (1800 M € USA)

Autoliv YSAB System 165 M €

Autoliv crash curtains 175 M €

Impact on business

Increased sales due to improved safety

SAAB, VOLVO Autoliv

Crash curtain >1100 M € (90 % exports)

Impact on research

World class research

Centres of excellence Ford and GM

Centre of excellence GM

Volvo SAAB 50% safer
Crash curtain 45%

Impact on safety standards
Conclusions

• Basic research initiated by an important societal need
• Multi-discipline research
• Mutual dialogue university research – industrial development
• Cluster within automotive industry marked by openness
• Condition for establishing research at Autoliv
• VINNOVA’s grants crucial
Impact of analysis as such (as we understand it)

**Policy level**
Ministry of Industry - improved understanding of what VINNOVA produces - also in other areas than traffic safety

Strategic value - national consensus on traffic safety research. Consensus that behavioural sciences research is important for entire system of traffic safety research.

**Industry**
They refer to the analysis. Important for location of GM and Fords safety research in Sweden.

**Research**
Instrumental for establishing SAFER research centre in Gothenburg
Feedback to researchers – their work has been important
Reflection on VINNOVA’s impact analyses

They have been possible to do and they have been extremely useful

Most important – they give a broader and more nuanced picture of impacts that follow from VINNOVA’s RTDI funding

Results have been positively received and easy to communicate at policy level

Analyses have been motivated by specific forward looking needs

Demands for competence (field, evaluation) higher than normal -> limits which analyses may be possible to perform successfully

We have not seen academic research that focuses on full effects of R&D

We welcome information on similar analyses elsewhere
Reflection (cont.)

Have we chosen too simple success stories?
E.g. analysis on User oriented ICT research 1984 – 2005 have met difficulties measuring socio-economic impact (work life research difficult to measure)

Complements *ex post* evaluations – often concluded before impact is visible

Key factor to communicate results in a way that policy makers can understand
Reflection (cont.)

Should impact analyses regard particularly important issues? E.g. ICT 1980 - 2005, biotechnology 1980 - 2005?

Or should we focus on mechanisms, instruments, how instruments complement each other?

How large studies are possible to manage?

Our impact analyses have been time consuming and fairly costly. They depend on availability of expertise – that policy makers will respect.

Are they done elsewhere?