The Relationship Between Road Safety and Infrastructure on 80 km/h Roads and Intersections: Using Accident Prediction Models

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• Introduction
• Aim of this study
• Accident Prediction Models
• Method
• Outlook
Introduction

- People killed in traffic crashes
  - Europe: 40,000 (2006)
  - the Netherlands: 817 (2006)
  - 791 (2007)
  - 750 (2008)

- To increase road safety
  - research & measures
  - in the Netherlands: Sustainable Safety vision
Introduction [2]

Accident Prediction Models
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Introduction [3]

Sustainable Safety vision
• aims to prevent crashes and, when that is not possible, to reduce the risk of serious injuries
• covers several areas
  – e.g. vehicles, education, drink and drug driving, road infrastructure
• there still is a lack of knowledge about what a sustainably safe road infrastructure is

(Wegman and Aarts, 2005)
Introduction [4]

Infrastructure
-Physical characteristics
-Road link / intersection

Driving behaviour
Observed behaviour:
-Speed
-Time/distance headway
-Lateral position

Road safety
-Crashes
-Killed & seriously injured

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Introduction [4]

**Infrastructure**
- The effects of crash barrier and trees on driving behaviour
- The effects of road width on the number of crashes

**Driving behaviour**

**Road safety**

**Accident Prediction Models**
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Introduction [4]

infrastructure & driving behaviour & road safety &

…………not widely studied and described………….
Introduction [4]

Accident Prediction Models

$E(\lambda) = \alpha Q^\beta e^{\sum \gamma_i x_i}$

(Reurings et al., 2006)

Infrastructure

Road safety

Accident Prediction Models

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Introduction [4]

*Accident Prediction Models*

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Most accident prediction models consider:

- Infrastructure
- Driving behaviour
- Road safety
• Models with driving behaviour?
  – 3 studies
  – different approach
  – not all succeeded

(Abdel-Aty & Essam Radwan, 2000; Caliendo, Guida & Parisi, 2007; Dietze et al., 2008)

→ No common approach
Aim of this study

• To examine an approach of accident prediction models which express the safety performance in terms of traffic, geometric characteristics and driving behaviour

• Restricted to rural 80 km/h roads and intersections which are under provincial administration
Express the safety performance of a road / intersection type in terms of traffic and geometric characteristics.
Accident Prediction Models

From: Reurings & Janssen (2007a)

- Input: road characteristics, traffic volume
- Output: number of crashes

Expected number of crashes

\[ \hat{\mu} = 3.68 \times 10^{-4} \cdot L^{0.81} \cdot INT^{0.45} \]

Road link length  Traffic volume
Accident Prediction Models [3]

From: Reurings & Janssen (2007a)
• Why developing these models?
  – Determine safety level of roads & intersections
  – Compare different designs
  – Proactive approach

  – For:
    • Researchers
    • Road authorities
Accident Prediction Models [5]

• Recommended to disaggregate to (Reurings et al. 2005)
  – Road category
  – Intersection type
  – Crash type

• Accident modification factors
  – Applied by some researchers
  – Describing the same as accident prediction models
  – Not in our models
Method

• Required data
  – Traffic data ✓
  – Crash data ✓
  – Geometric data → to be collected

from 2 provinces:
- 1,200 km road length
- 500 intersections

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Accident Prediction Models

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Shoulder

Number of lanes

Separation of driving directions

Marking

Road links

Vehicle-type exclusion ruling

Shoulder

Shoulder
Accident Prediction Models

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Intersections

Cycling and pedestrian facility

Signing

Marking

Number of lanes
Method [2]

- Study area: 80 km/h roads and intersections
  - Classified homogenous groups
    - Intersections – 3 groups
    - Road links – 4 groups

Roundabout
3-arm
4-arm

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Method [3]

- Initial models
  - AADT and road link length
  - Adding other correlating variables
Results

Project is ongoing…

…no results yet…
Outlook

- To study how and what kind of variables on driving behaviour should be included
Thank you for your attention!

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