SafetyCube - the European Road Safety Decision Support System

European Road Safety Decision Support System

Search

SafetyCube

DSS

The SafetyCube DSS is the European Road Safety Decision Support System, which has been produced within the European research project SafetyCube, funded within the Horizons 2020 Programme of the European Commission, aiming to support evidence-based policy making. The SafetyCube Decision Support System provides detailed interactive information on a large list of road accident risk factors and related road safety countermeasures. A Quick Guide on using the SafetyCube DSS, with instructions on how to browse the system, make a search and further refine the results, is available for download here.

Knowledge

Calculator

Methodology

Support



Prof. George Yannis National Technical University of Athens



SafetyCube DSS back-end database

- Coded studies, Synopses and Links undergo a thorough checking and debugging process
- All inputs are eventually stored in a relational database, which serves as the back-end of the DSS
- Front-end DSS results are retrieved through the DSS search Engine (queries on the back-end database).



Brussels, October 5, 2017

SafetyCube DSS Search Engine

Fully linked search

- search a road safety problem alone or through the measures
- search a measure alone or through the road safety problems
- search for risks and measures related to specific road user groups or crash types (accident categories)

Fully detailed search

- search by any parameter in each data table in the database
- Fully flexible search
 - adjust and customize search according to results
- Fully documented search
 - access background information at any stage (supporting documentation, links, etc.)



SafetyCube DSS Design Principles

- A **Modern** web-based tool
- Highly **Ergonomic** interface
- Simple structure
- Powerful **Search** Engines
- Fully **Documented** information
- Easily Updated



SafetyCube DSS Structure

Five entry points

Three Levels of Search

- Search pages
- Results pages
- Individual study pages

Two Interlinked Pillars

- Risk Factors
- Road Safety Measures



SafetyCube DSS Menu

Search
 Risk Factors & Measures

Knowledge

139 synopses

Calculator

Econ. Efficiency Evaluation (under development)

Methodology

System documentation

Support

Contact, help, feedback



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SafetyCube DSS Search Pages

DSS Search through five entry points:

- Keyword search (all database keywords)
- Risk factor search (taxonomy)
- Measures search (taxonomy)
- Road User Groups

(database keywords related to each group)

Accident Categories

(under development)

	V		Search	n Knowledge	Calculator	a A	9 9 9 Support	
CHILD PEDESTRIANS PEDESTRIANS PEDESTRIAN CROSSING PEDELEC	PEDESTRIANS	word earch	Risk actors	Measures	Road L Gro	laer ups	Acciden Cotegories	
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EDESTRIAN CRASHES	Pask Haddo (s			NUMBER OF STREET				
EDESTRIAN C <mark>R</mark> ASHES EDESTRIAN D <mark>ET</mark> ECTION	Hask Hactors Behavior	Infrastructure	Vohicle	Behavior	Infrastructure	Vehicle	Post Impact Ca	
EDESTRIAN CRASHES EDESTRIAN DETECTION EDESTRIAN SIGNAL	Behavior Functional Impairment	Infrastructure Adverse weather	Vohicle LGV	Behavior Education and	Infrastructure Traffic signals	Vohicle Not Applicable	Post Impact Ca	
EDESTRIAN CRASHES EDESTRIAN DETECTION EDESTRIAN SIGNAL	Behavior Runctional Impairment Traffic Rule Violations	Infrastructure Adverse weather Poor junction readability	Vehicle LGV Passenger Can	Behavior Education and voluntary treatings (programs	Infrastructure Truths signals treatments	Vehicle Not Applicable	Post Impact Ca Not Applicable	
EDESTRIAN CRASHES EDESTRIAN DETECTION EDESTRIAN SIGNAL	Behavior Functional Imperiment Treffic Rule Violations	Infractifucture Adverse weather Poor junction readability Arignade junctions	Vohicle LGV Pessenger Cars Pedestrien	Behavior Education and voluntary treatings/programs	Infrastructure Traffic signals treatments Road markings at junctions	Vehicle Not Applicable	Post Impact Car Not Applicable	
EDESTRIAN CRASHES EDESTRIAN DETECTION EDESTRIAN SIGNAL	Betavior Functional Imperment Treffic Rule Violations	Infractructure Adverse weather Poor junction readability Angrade junctions deficiencies	Vohicle LGV Pessenger Cars Pedeatrien PTW / ATV	Behavior Education and voluntary treatings/programs	Infractiveture Traffic signals treatments Road markings at jurctions Speed management	Vehicle Not Applicable	Poet Impact Ca Not Applicable	
	Behavior Runctional Impairment Traffic Rule Violations	Infrastructure Adverse weather Poor junction readability Angrade junctions deficiencies Western / barrier deficiencies (rask of casts with oncoming	Vohicle LGV Passenger Cars Podestrian PTW / ATV	Behavior Education and voluntary treatings (programs	Infrastructure Traffic signals treatments Road mensings at junctions Speed management & enforcement	Vehicle Not Applicable	Post Impact Ca Not Applicable	
edestrian crashes edestrian detection edestrian signal	Betavior Functional Imperiment Treffic Rule Violations	Infractructure Adverse weather Poor junction readability Ar-grade junctions deficiencies Wedan / barrier deficiencies (rak of cash with oncoming traffic)	Vohicle LGV Passenger Cars Pedestrien PTW / ATV	Behavior Education and voluntary treatings/programs	Infrastructure Traffic signals treatments Road markings at junctions Speed management Eventorcomment Speed management	Vehicle Not Applicable	Poet Impact Car Not Applicable	

SafetyCube DSS Results Pages

Saf

Search results

- Synopses, and their short summaries & colour codes
- Table listing the available studies

Refine search

- Specific Risk factor / Measure
- Other search filters
 - Road user groups: All, car occupants, drivers, passengers, PTW riders, pedestrians, cyclists, HGV.
 - <u>Road types</u>: All, motorways, rural roads, urban roads
 - Country: EU, EU countries (all names), US and Canada, Australia, Asia.

Links to related measures

- Select a specific risk factor / measure •
- Get the list of related measures

DSS	0	European Ro	ad Safety De	cision Supp	port System	
		Search	Knowledge	Calcolator	Methodology	Support
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	285	Development of casat- care (s) - when models for	ACCIDENT ANALYSIS PREVENTION 41.	ANS 2010	CESERVATIONAL	UNITED STATES

SafetyCube DSS Individual Study Pages

Title, author, source, abstract

 Link to URL for full-text download (depending on Institute permissions))

Study design info:

- Country
- Research Method, Design, Sample
- Exposure/Control group
- Risk/Outcome Group
- Modifying Conditions
- Potential limitations

Study results:

 Table listing the detailed effects reported in the study



Modeling work zone crash frequency by quantifying measurement errors in work zone length

Yang H., Ozbay K., Ozturk O., Yildirimoglu M.

Abstract

Work zones are temporary traffic control zones that can potentially cause safety problems. Maintaining safety, while implementing necessary changes on roadways, is an important challenge traffic engineers and researchers have to confront. In this study, the risk factors in work zone safety evaluation were identified through the estimation of a crash frequency (CF) model. Measurement errors in explanatory variables of a CF model can lead to unreliable estimates of certain parameters. Among these, work zone length raises a major concern in this analysis because it may change as the construction schedule progresses generally without being properly documented. This paper proposes an improved modeling and estimation approach that involves the use of a measurement error (ME) model integrated with the traditional negative binomial (NB) model. The proposed approach was compared with the traditional NB approach. Both models were estimated using a large dataset that consists of 60 work zones in New Jersey, Results showed that the proposed improved approach outperformed the traditional approach in terms of goodness-of-fit statistics. Moreover it is shown that the use of the traditional NB approach in this context can lead to the overestimation of the effect of work zone length on the crash occurrence.

DOI:10.1016/J.AAP.2013.02.031.

Summary

The study investigates workzone crashes in New Jersey state. 7 years of data are exploited. Full Bayesian Negative binomial models are applied. AADT, length of workzone and number of operating lanes in the workzone were found to increase frequency of injury and non-injury (property damage only) accidents.

Study Design

 Topic:
 RISK FACTOR
 Year:
 2013

 Source:
 ACCIDENT ANALYSIS AND PREVENTION 55 (2013) 1928#8211; 201
 1

Design: OBSERVATIONAL CROSS-SECTIONAL

Countries: UNITED STATES

Keywords: FULL BAYESIAN MEASUREMENT ERROR NEGATIVE BINOMIAL MODEL CRASH FREQUENCY SAFETY ANALYSIS WORK ZONE

Effects

Effect			Group		Effect	Effect Estimator			Estimate Lower	Estimate Upper	
No	p Outcome	Exposure	Туре	Group	Estimator	Specifications	Sample	Estimate	Limit	Limit	Conclusion Comments
1	NUMBER OF PROPERTY DAMAGE ONLY ACCIDENTS				SLOPE	FULL BAYESIAN NEGATIVE BINOMIAL MODEL		0.847	0.729	0.965	SIGNIFICANT NEGATIVE EFFECT ON ROAD SAFETY THE MODEL WITH THE BEST FIT IS PRESENTED (LOWER DIC VALUE). LOWER AND UPPER LIMIT REFER TO THE 95% CREDIBLE INTERVALS (2.5%-97.5%).
2	NUMBER OF PROPERTY DAMAGE				SLOPE			0.538	0.415	0.634	SIGNIFICANT NEGATIVE EFFECT ON ROAD SAFETY

SafetyCube Related Risks / Measures

Safety <mark>Cul</mark> DSS	European Road So	afety Decisi	ion Suppor	t System		
	Search	Knowledge	Calculator	Methodology	Support	

Related Studies for "poor visibility - darkness"

The following measures are related to the risk factor you selected. Select a measure from the table below to see the available SafetyCube results.

Behavior	Infrastructure	Vehicle	Post Impact Care		
Helmet, protective clothing and visibility	installation of road lighting	Enhanced Headlights (automated, adaptive,	Not Applicable		
	improvement of existing lightling				
		Night Vision			
		Vehicle backup camera - Reversing Detection or Camera portemer (REV)			

Countries	ID	Title	Source	Year	Design	Countries
CANADA NETHERLANDS UNITED KINGDOM UNITED STATES	327	Relationship Between Roadway Illuminance Level and Nighttime Rural Intersection Safety	TRANSPORTATION RESEARCH RECORD: JOURNAL OF THE TRANSPORTATION RESEARCH BOARD, NO. 2485, PP. 88#8211;15	2015	CROSS- SECTIONAL	UNITED STATES
	328	Road Lighting Effects on Bicycle and Pedestrian Accident Frequency Case	TRANSPORTATION RESEARCH RECORD: JOURNAL OF THE	2016	CROSS- SECTIONAL	CANADA

SafetyCube DSS Calculator

Economic Efficiency Evaluation Tool (E3)

- Combines information about the **effectiveness of a measure** (i.e. the percentage of crashes or casualties prevented) with the **costs** of this measure.
- Integrates updated information of crash-costs in the European countries
- Allows to express all costs and benefits of a measure in monetary values and conduct cost benefit analysis.
- Perform cost-benefit analysis with **own input data**.
- Select one of the SafetyCube examples of cost benefit analyses
 - Measures with high effectiveness
 - For which reliable cost information could be found
- Under development and coming soon ...



SafetyCube DSS Knowledge Wealth

SafetyCube DSS will eventually include by April 2018:

- more than 1,200 studies,
- with more than **7,500 estimates** of risks/measures effects on:
 - behaviour,
 - infrastructure,
 - vehicle, and
 - post impact care
- more than **150 Synopses**
- more than **50 cost-benefit analyses** (adjustable)



Development and Operation Phases

- SafetyCube DSS Pilot Operation
 - Started early 2017
 - User feedback exploited
- SafetyCube DSS Opening
 - October 2017
- Continuous Enhancement and Update
 - Until April 2018 (end of SafetyCube project)
 - And beyond...



Example questions addressed

- how important is my road safety problem?
- who else is having similar problems?
- what solutions are usually proposed for my problem?
- how efficient are the solutions proposed?
- which is the most efficient solution?
- and if I have a combination of problems ...

... then use SafetyCube DSS to have the answers



Delivering a long waited powerful tool

- SafetyCube DSS is the first integrated road safety support system developed in Europe
- SafetyCube DSS offers for the first time scientific evidence on:
 - risks and not only measures
 - risks and measures not only on infrastructure
 - a very large number of estimates of risks and measures effects
 - links between risks factors and measures
- SafetyCube DSS aims to be a reference system for road safety in Europe, constantly improved and enhanced



Dreams

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