Transport DTU - DTU Orbit (09/04/2018)

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The Danish National Travel Survey - declaration of variables TU 2006-17, version 1

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Authors: Christiansen, H. (Intern), Warnecke, M. (Intern)
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Adolescents' associations between travel behaviour and environmental impact: A qualitative study based on the Norm-Activation Model

The negative environmental impact of car-dependent daily transport is well known. Young people of today are the potential drivers of the future and their mode choice will influence the environment for many years. This study explores the associations drawn between daily transport and environmental impact among 15-year-old Danish adolescents. We conducted 50 in-depth interviews and analysed them using a data-driven inductive thematic approach. We interpret differences in pro-environmental awareness and engagement on the background of the Norm-Activation Model (Schwartz, 1977). Based on their personal norm and the denial of consequences and responsibility of own behaviour, we identified five sub-groups of adolescents called Environmentalists, Pragmatics, Indifferent, De-emphasisers, and Deniers. Results indicate a need for measures to increase adolescents’ awareness and acceptance of daily transport as a relevant issue in relation to sustainability. Such measures should include tangible feedback in a daily context while taking different coping strategies with regard to climate change into account.

A matheuristic for transfer synchronization through integrated timetabling and vehicle scheduling

Long transfer times often add unnecessary inconvenience to journeys in public transport systems. Synchronizing relevant arrival and departure times through small timetable modifications could reduce excess transfer times, but may also directly affect the operational costs, as the timetable defines the set of feasible vehicle schedules. Therefore better results in terms of passenger service, operational costs, or both, could be obtained by solving these problems simultaneously.
A Survey on Robustness in Railway Planning

Planning problems in passenger railway range from long term strategic decision making to the detailed planning of operations. Operations research methods have played an increasing role in this planning process. However, recently more attention has been given to considerations of robustness in the quality of solutions to individual planning problems, and of operations in general. Robustness in general is the capacity for some system to absorb or resist changes. In the context of railway robustness it is often taken to be the capacity for operations to continue at some level when faced with a disruption such as delay or failure. This has resulted in more attention given to the inclusion of robustness measures and objectives in individual planning problems, and to the providing of tools to ensure operations continue under disrupted situations. In
this paper we survey the literature on robustness in railway planning problems, considering how robustness is conceptualized and modelled for the individual problems of railway, the degree to which an overall railway robustness concept is present, and consider the future directions of robustness in railway planning.

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Authors: Lusby, R. M. (Intern), Larsen, J. (Intern), Bull, S. H. (Intern)
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Web of Science (2015): Indexed yes
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ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 2.418 SNIP 2.588 CiteScore 3.01
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BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.401 SNIP 2.441 CiteScore 3.02
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.477 SNIP 2.435
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 2.326 SNIP 2.577
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.739 SNIP 1.984
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.679 SNIP 2.041
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.299 SNIP 2.023
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.194 SNIP 1.913
Considering built environment and spatial correlation in modelling pedestrian injury severity

This study looks at mitigating and aggravating factors that are associated with the injury severity of pedestrians when they have crashes with another road user and overcomes existing limitations in the literature by posing attention on the built environment and considering spatial correlation across crashes. Reports for 6539 pedestrian crashes occurred in Denmark between 2006 and 2015 were merged with geographic information system resources containing detailed information about built environment and exposure at the crash locations. A linearised spatial logit model estimated the probability of pedestrians to sustain a severe or fatal injury conditional on the occurrence of a crash with another road user. This study confirms previous findings about older pedestrians and intoxicated pedestrians being the most vulnerable road users, and crashes with heavy vehicles and in roads with higher speed limits being related to the most severe outcomes. This study provides also novel perspectives by showing positive spatial correlation of crashes with the same severity outcome and emphasising the role of the built environment in the proximity of the crash. This study emphasises the need for thinking about traffic calming measures, illumination solutions, road maintenance programs and speed limit reductions. Moreover, this study emphasises the role of the built environment, as shopping areas, residential areas, and walking traffic density are positively related to a reduction in pedestrian injury severity. Often, these areas have in common a larger pedestrian mass that is more likely to make other road users more aware and attentive, while the same does not seem to apply to areas with lower pedestrian density.

General information
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Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Queensland, Technical University of Denmark
Authors: Prato, C. G. (Ekstern), Kaplan, S. (Intern), Patrier, A. (Ekstern), Rasmussen, T. K. (Intern)
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Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.665 SNIP 1.225 CiteScore 1.33
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.82 SNIP 1.411 CiteScore 1.58
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Consistency between subjectively and objectively measured hazard perception skills among young male drivers

Young male drivers have lower hazard perception skills (HPS) than older and more experienced drivers and a tendency to overestimate their skills in hazardous situations. Both factors contribute to an over-representation in traffic accidents. Based on a sample of 63 drivers aged 18-24, this study compares the consistency of HPS measured by objective and subjective measures and the link between these measures is the key contribution of the study. Both visible and hidden hazards are included. Objective measures of HPS include responsiveness and eye movements while driving in a driving simulator. Subjective measures of HPS include self-reports derived based on the Hazard Perception Questionnaire (HPQ), Driving Skill Questionnaire (DSQ), and Brief Sensation Seeking Scale (BSSS). Results show that drivers who respond to the hazards on time, as compared to drivers who do not respond, have higher scores on subjective measures of HPS and higher driving skills in the visible but not in the hidden condition. Eye movement analysis confirms the difference and shows that response in time to hazards indicate higher HPS and young drivers are poor at detecting hidden hazards. Drivers with a response in time locate the hazard faster, have more fixations, but dwell less on the hazard. At the same time, those who do not respond have a later first fixation and fewer but longer fixations on the hazard. High sensation seeking drivers respond to visible hazards on time, suggesting that sensation seeking does not affect HPS negatively when the hazard is visible. To enhance the HPS among young drivers, the results of this study suggest that specific hazard perception training is relevant, especially for hazards that require more advanced HPS.
Decarbonization of maritime transport: to be or not to be?

International shipping is at a crossroads as regards decarbonization. The Paris climate change agreement in 2015 (COP21) was hailed by many as a most significant achievement. Others were less enthusiastic, and more recently American President Trump decided to take the U.S. out of the agreement. Four years earlier, the International Maritime Organization (IMO) had adopted the most sweeping piece of regulation pertaining to maritime greenhouse gas (GHG) reduction, in the name of the Energy Efficiency Design Index (EEDI). In addition, one year after COP21, the IMO adopted a mandatory data collection system for fuel consumption of ships and agreed on an initial strategy and roadmap on the reduction of GHG emissions from ships. This paper takes a critical look at the above and other recent developments and focuses on the challenges faced by the industry if a path to significant CO2 reductions is to be successful. Difficulties and opportunities are identified, and the paper conjectures that the main obstacles are neither technical nor economic, but political.

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Authors: Psaraftis, H. N. (Intern)
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BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.039 SNIP 1.072 CiteScore 1.22
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.84 SNIP 1.022 CiteScore 1.61
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.759 SNIP 0.844 CiteScore 1.09
ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.474 SNIP 1.323 CiteScore 1.71
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.999 SNIP 1.397
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.998 SNIP 1.146
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.05 SNIP 1.275
Scopus rating (2007): SJR 0.859 SNIP 0.944
Scopus rating (2006): SJR 1.031 SNIP 1.115
Scopus rating (2005): SJR 0.769 SNIP 0.862
Development of Employment Sub-centres in the City of Ahmedabad, India

This article describes how employment sub-centres can be identified applying geo-spatial modelling techniques in the context of metropolitan areas in India, and how the development of these employment centres can be linked to the levels of accessibility to labour, access to transport infrastructure as well as land use mix and land use diversity. For the city of Ahmedabad, employment sub-centres are identified for the year 2010, while the progression of employment in retail, commercial and industrial sectors in each of these centres is studied for the period from 1980 to 2010. Definite the signs of sprawl-type development and polarization reversal are observed, including the emergence of new employment sub-centres across the urban area, and the rapid growth of centres further away from the central business district. Retail and commercial sectors have grown exponentially, whereas industrial and manufacturing sector’s growth is stagnant. This development is mixed and heterogeneous, with the growth of the retail and the commercial sectors found to have a significant and positive relation with access to labour and transport infrastructure. These identified patterns of development provide important information to urban planners enabling them to make informed decision, for example, in locating future employment activities, identifying future transit-oriented development nodes, etc.

Effects of new bus and rail rapid transit systems – an international review

Cities worldwide are implementing modern transit systems to improve mobility in the increasingly congested metropolitan areas. Despite much research on the effects of such systems, a comparison of effects across transit modes and countries has not been studied comprehensively. This paper fills this gap in the literature by reviewing and comparing the effects obtained by 86 transit systems around the world, including Bus Rapid Transit (BRT), Light Rail Transit (LRT), metro and heavy rail transit systems. The analysis is twofold by analysing (i) the direct operational effects related to travel time, ridership and modal shifts, and (ii) the indirect strategic effects in terms of effects on property values and urban development. The review confirms the existing literature suggesting that BRT can attract many passengers if travel time reductions are significantly high. This leads to attractive areas surrounding the transit line with increasing property values. Such effects are traditionally associated with attractive rail-based public transport systems. However, a statistical comparison of 41 systems did not show significant deviations between effects on property values resulting from BRT, LRT and metro systems, respectively. Hence, this paper indicates that large strategic effects can be obtained by implementing BRT systems at a much lower cost.
Electric bus fleet size and mix problem with optimization of charging infrastructure

Battery electric buses are seen as a well-suited technology for the electrification of road-based public transport. However, the transition process from conventional diesel to electric buses faces major hurdles caused by range limitations and required charging times of battery buses. This work addresses these constraints and provides a methodology for the cost-optimized planning of depot charging battery bus fleets and their corresponding charging infrastructure. The defined problem covers the scheduling of battery buses, the fleet composition, and the optimization of charging infrastructure in a joint process. Vehicle schedule adjustments are monetized and evaluated together with the investment and operational costs of the bus system. The resulting total cost of ownership enables a comparison of technical alternatives on a system level, which makes this approach especially promising for feasibility studies comprising a wide range of technical concepts. Two scenarios of European cities are analyzed and discussed in a case study, revealing that the cost structure is influenced significantly by the considered bus type and its technical specifications. For example, the total energy consumption of the considered lightweight bus is up to 32% lower than the total consumption of the high range bus, although the deadheading mileage increases. However, the total costs of ownership for operating both bus types are relatively close, due to the increased fleet size and driver expenses required for the lightweight bus system. The case study furthermore reveals that a mixed fleet of different bus types could be advantageous depending on the operational characteristics of the bus route.

General information

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Organisations: Department of Management Engineering, Management Science, Operations Research, Transport DTU, Operations Management, RWTH Aachen University
Authors: Rogge, M. (Ekstern), van der Hurk, E. (Intern), Larsen, A. (Intern), Sauer, D. U. (Ekstern)
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Scopus rating (2013): SJR 3.164 SNIP 3.377 CiteScore 6.59
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 2.854 SNIP 3.108 CiteScore 5.69
ISI indexed (2012): ISI indexed yes
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Evaluation of land-use and transport network effects on cyclists' route choices in the Copenhagen Region in value-of-distance space

Growing interest in sustainable transportation systems has driven decision-makers toward policies and investments aimed at promoting cycling, but little to no effort has been made toward incorporating bicycle transport in transport planning models. This study contributes toward this direction by estimating a bicycle route choice model in value-of-distance space from a large sample of 3384 cycling trips that were traced with GPS devices in the Copenhagen Region. The novelty of this study lies in (i) observing cyclists' behavior in a cycling-oriented country, (ii) exploiting rich data about the cycling environment, (iii) estimating the model in value-of-distance rather than preference space, and (iv) not focusing only on preferences for traditional variables (e.g., distance, turns, hilliness, intersections, motorized road characteristics), but also on perceptions and preferences for bicycle facilities (e.g., bicycle lanes, bicycle paths, bicycle traces) and land-use designations (e.g., residential, industrial, sports, scenic areas). The findings from the model show that: (i) cyclists exhibit heterogeneous preferences for avoiding right and left turns, cycling the wrong way, using roundabouts and bridges, and cycling alongside residential and scenic areas; (ii) cyclists dislike cycling on unpaved and hilly surfaces and alongside larger roads; (iii) cyclists have clear perceptions about different types of bicycle facilities, with a preference for bicycle lanes and segregated paths; (iv) cyclists have clear perceptions about land-use designations, with a preference for cycling alongside sports and scenic areas; (v) time-of-day and air temperature contribute to the perceptions of cyclists and their preferences for bicycle facilities and land-use designations.

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Authors: Prato, C. G. (Ekstern), Halldórsdóttir, K. (Intern), Nielsen, O. A. (Intern)
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Factors of electric vehicle adoption: A comparison of conventional and electric car users based on an extended theory of planned behavior

Increasing the share of battery electric vehicles (BEV) in the total car fleet is regarded as a promising way to reduce local car emissions. Based on online surveys in Denmark and Sweden, this study compares BEV users’ (n = 673) and conventional vehicle (CV) users’ (n = 1794) socio-demographic profiles, attitudinal profiles, and mobility patterns. In line with previous research, BEV users are typically male, highly educated, have high incomes, and often more than one car in their household. Additionally, BEV users perceive less functional barriers toward BEV use and have more positive attitudes and norms than CV users. The different profiles of these user groups suggest a separate analysis of potential factors of BEV adoption in both groups. In regression analyses, CV and BEV users’ intention to use/purchase a BEV is modeled based on factors of the Theory of Planned Behavior extended by personal norm, perceived mobility necessities, and BEV experience. For CV users, symbolic attitudes related to BEVs are the most important factor of intention, while perceived functional barriers in terms of driving range are most relevant for BEV users’ intention. How BEV users cope with trips of longer distance seems of particular relevance. In multiple car households, we found the percentage of actual BEV usage related to the type of other cars in the household, perceived functional barriers of BEVs as well as (successful) behavioral adaption to longer trips by BEVs. Based on the results, we discuss ways to increase BEV adoption for current users and non-users.
Household electricity consumers' incentive to choose dynamic pricing under different taxation schemes: Electricity consumers' incentive to choose dynamic pricing

Dynamic pricing of retail electricity, as opposed to the widely applied average pricing, has often been proposed to enhance economic efficiency through demand response. The development of variable production from renewable energies and expectations about the installation of heat pumps and electric vehicles has now reinforced interest in flexible demand and dynamic pricing. With a roll-out of smart metering one important technical hurdle is going to be cleared, and dynamic retail pricing may soon become an eligible option for many households. We quantify the potential incentives to adopt new pricing schemes using exemplary Danish data. Until now, limited activity of household consumers on retail markets indicates that switching supplier or contract is perceived costly. We apply the concept of switching costs to explain this hesitant behavior, and use it to estimate a threshold level based on recent observations in the Danish market. We calculate potential savings from dynamic pricing and show how the choice of electricity taxation technique may hamper or enhance potential benefits. In the light of switching costs, our results suggest that the combination of smart meter roll-out and dynamic pricing offerings might be insufficient to convince the majority of households to switch contracts and become active in response to prices, unless they hold a substantial flexibility potential. Dynamic taxation, even if applied to parts of the levies, could contribute significantly to inducing flexible consumption.

General information
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Organisations: Department of Management Engineering, Systems Analysis, Transport DTU, Dansk Energi
How the reverse supply chain impacts the firm's financial performance: A manufacturer's perspective

Purpose – Although manufacturers have traditionally viewed reverse supply chain (RSC) activities as a costly nuisance, more recent research has found that the RSC can contribute to the firm’s financial performance. This paper identifies how the RSC can contribute to the firm’s financial performance and examines the exogenous contingency factors decisive for the contribution’s size. Because the exogenous factors are outside the control of the firm’s operations and supply chain management, the factors influence the RSC’s financial contribution irrespective of managerial policies and design decisions.

Design/Methodology/Approach – The paper applies a systematic literature review using the sequence of planning the review, searching and screening literature, extracting information from the selected literature, and synthesizing and analyzing findings. 112 papers were included.

Findings – The study has identified 15 distinct opportunities for RSC-contribution to the firm’s financial performance. The study has identified 56 contingency factors. These are related to market segmentation, customer behavior, product design, and the firm’s distributor network. The study includes an interrelationship network between factors and the RSC’s contribution.

Practical Implications – For managers, the paper shows how the RSC can increase the firm’s financial performance and which contingency factors determine whether operating a RSC will be financially viable if implemented.

Originality/Value – While extant literature includes several reviews about RSC-related managerial policies and design decisions, this paper contains the very first collection of RSC-contribution opportunities available to manufacturers as well as the first review of exogenous contingency factors.
Mixed Integer Linear Programming for new trends in wind farm cable routing

The efficient production of green energy plays an important role in modern economies. In this paper we address the optimization of cable connections between turbines in an offshore wind park. Different versions of this problem have been studied recently. In a previous joint project with Vattenfall BA Wind (a global leader in energy production) we have studied and modeled the main constraints arising in practical cases. Building on that model, in the present paper we address new features that have been recently proposed by Vattenfall's experts. Turbines are becoming still more customized, therefore it is important to be able to evaluate the impact of new technologies with a flexible optimization tool. We here show how some new features can effectively be modeled and solved using a Mixed-Integer Linear Programming paradigm. Computational results on a real-world case are briefly presented.
Optimal wind farm cable routing: Modeling branches and offshore transformer modules

Many EU countries aim at reducing fossil fuels in the near future, hence an efficient production of green energy is very important to reach this goal. In this article, we address the optimization of cable connections between turbines in an offshore wind park. Different versions of the problem have been studied in the recent literature. As turbines are becoming still more customized, it is important to be able to evaluate the impact of new technologies with a flexible optimization tool.
for scenario evaluation. In a previous joint project with Vattenfall BA Wind (a global leader in energy production) we have studied and modeled the main constraints arising in practical cases. Building on that model, in the present article, we address new technological features that have been recently proposed by Vattenfall’s experts. We show how some new features can be modeled and solved using a Mixed-Integer Linear Programming paradigm. We report and discuss computational results on the performance of our new models on a set of real-world instances provided by Vattenfall.

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Scopus rating (2016): CiteScore 1.22 SJR 1.188 SNIP 1.093
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.927 SNIP 1.033 CiteScore 1.21
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.955 SNIP 1.358 CiteScore 1.03
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.158 SNIP 1.282 CiteScore 1.24
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.801 SNIP 1.017 CiteScore 0.85
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.969 SNIP 1.32 CiteScore 1.18
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.453 SNIP 1.237
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.135 SNIP 1.506
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.884 SNIP 1.247
Scopus rating (2007): SJR 1.069 SNIP 1.36
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.733 SNIP 1.71
Scopus rating (2005): SJR 0.936 SNIP 1.304
Scopus rating (2004): SJR 0.634 SNIP 1.168
Scopus rating (2003): SJR 0.706 SNIP 1.281
Scopus rating (2002): SJR 0.553 SNIP 0.974
Scopus rating (2001): SJR 0.863 SNIP 1.068
Scopus rating (2000): SJR 0.546 SNIP 1.182
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The North Sea Offshore Wind Service Industry: Status, perspectives and a joint action plan

The Offshore Wind Service sector is about to established itself as an industrial sector with an own identity, own organisation, and with large future challenges. The article introduces this new sector, including assessment of present and future market sizes. The overall aim of the research reported in this article was to increase the innovation capacity of the European offshore wind servicing (OWS) sector by establishing cross-regional cooperation and intensifying the relationship between research and the offshore wind industry. The article uses the concept of innovation system foresight (ISF). The linking of the two concepts of foresight and innovation systems has been explored by several studies, but ISF takes a further integration of the two concepts. The article presents a set of concrete actions at multiple levels to support the development of the offshore wind service sector. The findings provides an input for a concerted effort for supporting both the offshore wind development and the emerging clusters of offshore wind services around the North Sea. In addition, the article addresses the value of the ISF approach to such policy development.

General information

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Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU, Department of Wind Energy, Integration & Planning
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Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.999 SNIP 3.387 CiteScore 8.35
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 3.106 SNIP 3.761 CiteScore 7.79
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 3.072 SNIP 3.889 CiteScore 7.88
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 2.814 SNIP 3.915 CiteScore 7.24
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.787 SNIP 3.901 CiteScore 7.39
ISI indexed (2011): ISI indexed yes
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The profit maximizing liner shipping problem with flexible frequencies: logistical and environmental considerations

The literature on liner shipping includes many models on containership speed optimization, fleet deployment, fleet size and mix, network design and other problem variants and combinations. Many of these models, and in fact most models at the tactical planning level, assume a fixed revenue for the ship operator and as a result they typically minimize costs. This treatment does not capture a fundamental characteristic of shipping market behavior, that ships tend to speed up in periods of high freight rates and slow down in depressed market conditions. This paper develops a simple model for a fixed route scenario which, among other things, incorporates the influence of freight rates, along with that of fuel prices and cargo inventory costs into the overall decision process. The objective to be maximized is the line’s average daily profit. Departing from convention, the model is also able to consider flexible service frequencies, to be selected from a broader set than the standard assumption of one call per week. It is shown that this may lead to better solutions and that the cost of forcing a fixed frequency can be significant. Such cost is attributed either to additional fuel cost if the fleet is forced to sail faster to accommodate a frequency that is higher than the optimal one, or to lost income if the opposite is the case. The impact of the line’s decisions on CO2 emissions is also examined and illustrative runs of the model are made on three existing services.

General information
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D-efficient or deficient? A robustness analysis of stated choice experimental designs

This paper is motivated by the increasing popularity of efficient designs for stated choice experiments. The objective in efficient designs is to create a stated choice experiment that minimizes the standard errors of the estimated parameters. In order to do so, such designs require specifying prior values for the parameters to be estimated. While there is significant literature demonstrating the efficiency improvements (and cost savings) of employing efficient designs, the bulk of the literature tests conditions where the priors used to generate the efficient design are assumed to be accurate. However, there is substantially less literature that compares how different design types perform under varying degree of error of the prior. The literature that does exist assumes small fractions are used (e.g., under 20 unique choice tasks generated), which is in contrast to computer-aided surveys that readily allow for large fractions. Further, the results in the literature are abstract in that there is no reference point (i.e., meaningful units) to provide clear insight on the magnitude of any issue.

Our objective is to analyze the robustness of different designs within a typical stated choice experiment context of a trade-off between price and quality. We use as an example transportation mode choice, where the key parameter to estimate is the value of time (VOT). Within this context, we test many designs to examine how robust efficient designs are against a misspecification of the prior parameters. The simple mode choice setting allows for insightful visualizations of the designs themselves and also an interpretable reference point (VOT) for the range in which each design is robust. Not surprisingly, the D-efficient design is most efficient in the region where the true population VOT is near the prior used to generate the design: the prior is $20/h and the efficient range is $10–$30/h. However, the D-efficient design quickly becomes the most inefficient outside of this range (under $5/h and above $40/h), and the estimation significantly degrades above $50/h. The orthogonal and random designs are robust for a much larger range of VOT. The robustness of Bayesian efficient designs varies depending on the variance that the prior assumes. Implementing two-stage designs that first use a small sample to estimate priors are also not robust relative to uninformative designs. Arguably, the random design (which is the easiest to generate) performs as well as any design, and it (as well as any design) will perform even better if data cleaning is done to
The role of intention as mediator between latent effects and behavior: application of a hybrid choice model to study departure time choices

An increasing number of papers are focusing on integrating psychological aspects into the typical discrete choice models. The majority of these studies account for several latent effects, but they mainly focused on the direct effect of attitudes, perception, and norms in the discrete choice. None of them consider the effect of intention and its role as mediator between those psychological effects and the choice, as implied in the Theory of Planned Behavior. In this paper we contribute to the literature in this field by specifically studying the direct effect of the intention on the actual behavior, while attitude, social norms, and perceived behavioral control affect the intention to behave in a given way. We apply a hybrid choice model to study the departure time choice. For this, we use data from Danish commuters in the morning rush hours in the Greater Copenhagen area. We find a significant effect of the intention to arrive at work on time on the departing time choice, and also a significant effect of the lower level mediators on intention. Furthermore, the attitude toward short travel time is also significant in explaining the departure time choice. Finally, in terms of forecasting, we find that individuals who have a strong intention to be at work on time will be less likely to reschedule their departure time. This suggests that campaigns targeting the working culture could affect the subject norms among colleagues, which in turn influence individuals' intention to be on time or to reschedule to a less congested time slot.
A Quantitative Property-Property Relationship for the Internal Diffusion Coefficients of Organic Compounds in Solid Materials

Indoor releases of organic chemicals encapsulated in solid materials are major contributors to human exposures and are directly related to the internal diffusion coefficient in solid materials. Existing correlations to estimate the diffusion coefficient are only valid for a limited number of chemical-material combinations. This paper develops and evaluates a quantitative property-property relationship (QPPR) to predict diffusion coefficients for a wide range of organic chemicals and materials. We first compiled a training dataset of 1103 measured diffusion coefficients for 158 chemicals in 32 consolidated material types. Following a detailed analysis of the temperature influence, we developed a multiple linear regression model to predict diffusion coefficients as a function of chemical molecular weight (MW), temperature, and material type (adjusted R2 of 0.93). The internal validations showed the model to be robust, stable and not a result of chance correlation. The external validation against two separate prediction datasets demonstrated the model has good predicting ability within its applicability domain (R2ext > 0.8), namely MW between 30 and 1178 g/mol and temperature between 4 and 180 °C. By covering a much wider range of organic chemicals and materials, this QPPR facilitates high-throughput estimates of human exposures for chemicals encapsulated in solid materials.
Endogenous scheduling preferences and congestion

We consider the timing of activities through a dynamic model of commuting with congestion, in which workers care solely about leisure and consumption. Implicit preferences for the timing of the commute form endogenously due to temporal agglomeration economies. Equilibrium exists uniquely and is indistinguishable from that of a generalized version of the classical Vickrey bottleneck model, based on exogenous trip-timing preferences, but optimal policies differ: the Vickrey model will misstate the benefits of a capacity increase, it will underpredict the benefits of congestion pricing, and pricing may make people better off even without considering the use of revenues.

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A Bayesian Additive Model for Understanding Public Transport Usage in Special Events

Public special events, like sports games, concerts and festivals are well known to create disruptions in transportation systems, often catching the operators by surprise. Although these are usually planned well in advance, their impact is difficult to predict, even when organisers and transportation operators coordinate. The problem highly increases when several events happen concurrently. To solve these problems, costly processes, heavily reliant on manual search and personal experience, are usual practice in large cities like Singapore, London or Tokyo. This paper presents a Bayesian additive model with Gaussian process components that combines smart card records from public transport with context information about events that is continuously mined from the Web. We develop an efficient approximate inference algorithm using expectation propagation, which allows us to predict the total number of public transportation trips to the special event areas, thereby contributing to a more adaptive transportation system. Furthermore, for multiple concurrent event scenarios, the proposed algorithm is able to disaggregate gross trip counts into their most likely components related to specific events and routine behavior. Using real data from Singapore, we show that the presented model outperforms the best baseline model by up to 26 percent in R-2 and also has explanatory power for its individual components.
A Branch-and-Price algorithm for railway rolling stock rescheduling

How to best reschedule their fleet of rolling stock units during a disruption is an optimization problem regularly faced by railway operators. Despite the problem’s high complexity, it is still usually solved manually. In this paper we propose a path based mathematical formulation and solve it using a Branch-and-Price algorithm. We demonstrate that, unlike flow based approaches, our formulation is more easily extended to handle certain families of constraints, such as train unit maintenance restrictions. The proposed algorithm is benchmarked on several real-life instances provided by the suburban railway operator in Copenhagen, DSB S-tog. When used in combination with a lower bound method taken from the literature we show that near-optimal solutions to this rescheduling problem can be found within a few seconds. Furthermore, we show that the proposed methodology can be used, with minor modification, on a tactical planning level, where it produces near-optimal rolling stock schedules in minutes of CPU time.

General information
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Scopus rating (2013): SJR 3.203 SNIP 3.487 CiteScore 4.64
A Branch-and-Price Approach to the Feeder Network Design Problem

In this paper we consider the problem of designing a container liner shipping feeder network. The designer has to choose which port to serve during many rotations that start and end at a central hub. Many operational characteristics are considered, such as variable leg-by-leg speeds and cargo transit times. Realistic instances are generated from the LinerLib benchmark suite. The problem is solved with a branch-and-price algorithm, which can solve most instances to optimality within one hour. The results also provide insights on the cost structure and desirable features of optimal routes. These insights were obtained by means of an analysis where scenarios are generated varying internal and external conditions, such as fuel costs and port demands.

General information
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Accuracy of young male drivers' self-assessments of driving skill
Accurate self-assessment of skill is important because it creates an appropriate level of confidence and hence behaviour. Inaccurate self-assessment of driving ability has been linked to reckless driving and accidents. Inaccurate self-assessment of driving skills may be a contributing factor to the over-representation of young male drivers in accident statistics. Most previous research on self-assessment of driving skills did not compare self-reported skills to objectively measured driving skills, so the aims of this study were: (1) to test the accuracy of young male drivers' self-assessments of specific driving skills by comparing them with performance in a driving simulator; (2) to test whether self-assessment accuracy varied with driving skill, driving experience and sensation-seeking propensity. We found that young male drivers' self-assessments were inconsistent with their driving performance, and that this inconsistency varied with driving skill, driving experience and sensation-seeking propensity. Groups with particularly inaccurate self-assessments are at high risk, because of their relative lack of skill, high mileage and sensation-seeking propensity. Self-assessments of hazard prediction and detection skills were particularly inaccurate. Understanding self-assessments of driving skill is crucial, but further studies are needed to allow preventive policies and interventions to take factors affecting self-assessments into account.

General information
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Actual preferences for EV households in Denmark and Sweden

Battery electric vehicles (EVs) have received vast attention in the recent decade, especially due to their potential environmental benefits. The car industry has invested huge amounts in the battery electric vehicle technology, leading to a much larger selection of car models with better comfort, driving range and options for recharging the batteries. Several studies have indicated that a great share of car households would now be able to maintain their current mobility patterns with only a minor level of adaption (Christensen 2011; Pearre et al. 2011; Greaves et al. 2014). Still, the driving range of a fully recharged EV is of great importance to the potential users (Jensen et al. 2013; Dimitropoulos et al. 2013; Mabit & Fosgerau 2011; Franke & Krems 2013), but as the battery capacity of the EVs continue to increase, the mobility constraints related to former EV models will most probably be reduced. Thus, the EV alternative has changed from being a product for a very small group of enthusiasts to being an actual car alternative for a common household and knowledge about which type of households would be interested in EVs is extremely valuable for both industry and policy makers.

However, as the EV market is still quite immature in most countries, lack of data on EV users is a common problem for researchers. Data on EV purchase and use have thus often been collected by means of data from intentional statements (see e.g. Bühler et al. 2014), stated preferences (see e.g. Bunch et al. 1993; Hidrue et al. 2011; Jensen et al. 2014) and EV vehicle trials (Golob & Gould 1998; Franke & Krems 2013; Jensen et al. 2014). While such studies have provided important insight into various areas of the EV market, the fact that the results are not based on actual behaviour means that they are subject to a high degree of uncertainty. Being the global EV market forerunner, Norway has a better foundation for studying the EV market based on actual EV owners. On these grounds, Klöckner et al. (2013), studied differences in car use between EV and conventional vehicle (CV) users. Also in Norway, Mersky et al. (2016) and Bjerkan et al. (2016) both studied the effect of policy incentives on EV purchase. Compared to these existing studies, we contribute to the literature with a more advanced model to study the EV market and we focus on the market in Denmark and Sweden. In particular, we use revealed preference information to investigate how household characteristics, attitudes, norms, perceived barriers and perceived functional attributes of the EVs affect the probability of being an EV household.

The data utilized in this study was collected in connection with the EU project GREAT, which aims to reduce fossil emissions by improving supply for alternative-fuelled vehicles in northern Europe. Besides detailed individual and household characteristics from a sample of both EV and CV household users, the data contains detailed information on individual determinants of EV adaption based on the Theory of Planned Behaviour (Ajzen 1991). Data were collected through an online survey in Sweden and Denmark. The Swedish study was distributed through different channels including the intranet of regions Skåne and Västra Götaland, different newsletters and EV related facebook groups. In Denmark, EV users were contacted via the infrastructure provider E.ON, while the CV users were contacted through the online panel of the market research institute EPINION. In total 1364 observations are available for Denmark and 1288 for Sweden. Descriptive statistics of the sample show that EV respondents were to a much higher extend male, had a higher household income and higher education level and were more often self-employed, lived less often alone and more often had children compared to CV users. Comparing Tesla users to other EV users, we found that Tesla users perceived less functional barriers in terms of EV usage, had more positive affective attitudes related to driving an EV and felt to a higher degree supported by relevant others to use/buy an EV (subjective norm). Interestingly, they did not report more positive symbolic attitudes in relation to their EV ownership. We modelled the probability of being an EV household with an advanced discrete choice model, taking both household characteristic and the latent determinants of EV adoption into account. A preliminary hybrid choice model with a latent variable for perceived barriers and most relevant household characteristics is presented below for the Danish sample.
A dynamic programming approach for quickly estimating large network-based MEV models

We propose a way to estimate a family of static Multivariate Extreme Value (MEV) models with large choice sets in short computational time. The resulting model is also straightforward and fast to use for prediction. Following Daly and Bierlaire (2006), the correlation structure is defined by a rooted, directed graph where each node without successor is an alternative. We formulate a family of MEV models as dynamic discrete choice models on graphs of correlation structures and show that the dynamic models are consistent with MEV theory and generalize the network MEV model (Daly and Bierlaire, 2006). Moreover, we show that these models can be estimated quickly using the concept of network flows and the nested fixed point algorithm (Rust, 1987). The main reason for the short computational time is that the new formulation allows to benefit from existing efficient solution algorithms for sparse linear systems of equations. We present numerical results based on simulated data with varying number of alternatives and nesting structures. We estimate large models, for example, a cross-nested model with 200 nests and 500,000 alternatives and 210 parameters that needs between 100–200 iterations to converge (4.3 h on an Intel(R) 3.2 GHz machine using a non-parallelized code). We also show that our approach allows to estimate a cross-nested logit model of 111 nests with a real data set of more than 100,000 observations in 14 h.
A Joint Route Choice Model for Electric and Conventional Car Users

Introduction

Worldwide, governments have committed to reducing air pollution and carbon emissions. With a higher share of renewable sources in the electricity production, battery electric cars (EVs) could play a significant role in maintaining these commitments. Growing literature shows an increasing interest in EVs and their market, but current EV travel demand
studies are usually based on data collected from users of conventional gasoline or diesel engine cars (CVs) (see e.g. (Golob and Gould 1998; Pearre et al. 2011; Greaves et al. 2014). EVs are however different from CVs in a number of ways, in particular when it comes to the driving range and the refuelling/recharging which can lead to behavioural changes (Jensen and Maib 2015). EV users might avoid longer and less-planned trips and, when deciding on a route, they might select roads where the general speed is lower, the trip length is shorter, or the charging facilities are better. On the other hand, over a longer period of time, many users do not need charging other than overnight charging at home in order to keep up with their current behaviour (Christensen et al. 2010). Thus, the impact on traffic of a large scale EV adoption is not obvious, as it cannot be assumed that CVs currently on the road are simply replaced by EVs and individual behaviour otherwise stays constant.

Understanding the behaviour of EV users is important in a number of ways. Beside potential environmental effects, there is a need to understand other related effects, such as effects on the electricity network and the transport network. The objective of this study is to use revealed preferences (RP) data to investigate differences in route choice behaviour between CV and EV users. To our knowledge, this is the first time that a state-of-the-art route choice model has been estimated on RP EV data. In addition, the level of detail in the data allows for accounting for congestion, reliability, topology, weather and socioeconomic background.

Method
This study exploits a unique and vast dataset consisting of GPS records from a large demonstration project about EVs conducted in Denmark during the period 2011-2013. Households participating in the trial had an EV available for a period of three months during which all trips were GPS logged. Additionally, some of the households GPS logged trips by their CV in the month before and the month after the EV was received. The GPS traces were matched to the very detailed NAVTEQ street network (NAVTEQ 2010). The high level of detail of the network is crucial, as EV users might use smaller roads with lower speeds in order to save energy due to current technological restrictions on driving distances. Following the procedure in Prato et al. (2014), route choice behaviour is modelled with a two-stage approach consisting of choice set generation and model estimation. The first stage used a doubly stochastic generation process to generate a choice set consisting of a maximum of 100 unique alternatives for each observed route. Subsequently, the observations were filtered to exclude observations for which the choice set contained only one alternative route or did not contain any alternative reasonably similar to the observed route. In the second stage, a mixed path size correction logit model was estimated for modelling route choice behaviour, (Bovy et al. 2008). Comparison of EV and CV preferences is made possible by estimating jointly across data from each technology using a logit scaling approach with at least one generic parameter across data (Bradley and Daly 1997).

Data
After the map matching and filtering processes, GPS records were available for about 90,000 EV trips from 379 households. About 6,500 CV trips were logged for about 100 households in the month before and after the EV was used. The sample of households was based on voluntary participation under the condition that the household already owned at least one car and had a dedicated parking space where the EV could be home charged. In the trial period, the household had access to both their CV and EV, but they were encouraged to use the EV as the primary option. The participating households resided in 27 of the 98 municipalities in Denmark and were distributed across the entire country (see Figure 1). For trial participation purposes, one household member filled an online application form with information about the household and its composition. Each trip has been merged with weather information from local weather stations, inducing that information about precipitation, wind speed, temperature and visibility at the time of departure is available. The NAVTEQ network consists of 636,243 links covering the entire country and all road classes from large highways to minor local roads.

General information
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A matheuristic approach for solving the Integrated Timetabling and Vehicle Scheduling Problem
The Integrated Timetabling and Vehicle Scheduling Problem (IT-VSP) is a generalization of the well-known Vehicle Scheduling Problem (VSP). In the IT-VSP the trips in the original timetables may be modified in terms of arrival and departure times in order to minimize a new objective function that considers both operational costs and passenger transfer costs. Starting from a base timetable, the allowed modifications include shifting the departure time from the first station of each trip and also the extension of dwell times at important stops where large flows of passengers are expected to transfer between different trips. We consider transfers between bus trips scheduled by the model, but also transfers to other fixed
A multiple ship routing and speed optimization problem under time, cost and environmental objectives

The purpose of this paper is to investigate a multiple ship routing and speed optimization problem under time, cost and environmental objectives. A branch and price algorithm as well as a constraint programming model are developed that consider (a) fuel consumption as a function of payload, (b) fuel price as an explicit input, (c) freight rate as an input, and (d) in-transit cargo inventory costs. The alternative objective functions are minimum total trip duration, minimum total cost and minimum emissions. Computational experience with the algorithm is reported on a variety of scenarios.

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Analysing improvements to on-street public transport systems: a mesoscopic model approach

Light rail transit and bus rapid transit have shown to be efficient and cost-effective in improving public transport systems in cities around the world. As these systems comprise various elements, which can be tailored to any given setting, e.g. pre-board fare-collection, holding strategies and other advanced public transport systems (APTS), the attractiveness of such systems depends heavily on their implementation. In the early planning stage it is advantageous to deploy simple and transparent models to evaluate possible ways of implementation. For this purpose, the present study develops a mesoscopic model which makes it possible to evaluate public transport operations in details, including dwell times, intelligent traffic signal timings and holding strategies while modelling impacts from other traffic using statistical distributional data thereby ensuring simplicity in use and fast computational times. This makes it appropriate for analysing the impacts of improvements to public transport operations, individually or in combination, in early planning stages. The paper presents a joint measure of reliability for such evaluations based on passengers’ perceived travel time by considering headway time regularity and running time variability, i.e. taking into account waiting time and in-vehicle time. The approach was applied on a case study by assessing the effects of implementing segregated infrastructure and APTS elements, individually and in combination. The results showed that the reliability of on-street public transport operations mainly depends on APTS elements, and especially holding strategies, whereas pure infrastructure improvements induced travel time reductions. The results further suggested that synergy effects can be obtained by planning on-street public transport coherently in terms of reduced travel times and increased reliability.

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Anger expression among Danish cyclists and drivers: A comparison based on mode specific anger expression inventories

Based on the short form of the driving anger expression inventory (DAX-short, 15-item), the present study developed an adapted version of the DAX for cyclists (CAX, 14 items). The data basis was an online survey of 2000 inhabitants of Denmark. A principle component analysis on the translated DAX-short confirmed the 4-factor solution of the original study differentiating between (1) personal physical aggressive expression, (2) use of a vehicle to express anger, (3) verbal aggressive expression and (4) adaptive/constructive expression. In case of cycling, the factor “use of a vehicle to express anger” only included one item and was left out. Based on the results, reliable subscales were developed. Drivers scored higher in verbal aggressive expression than cyclists, while there was no significant difference in constructive expression. The subscales for drivers and cyclists showed significant relations to age, gender, self-reported aggressive behaviours and traffic fines: Women scored for instance lower in physical expression, while older people scored higher in constructive expression. The effect of age and gender on anger expression among drivers and cyclists remained significant when controlling for exposure and other factors in linear regression analyses. These analyses also showed a relationship between a positive attitude towards driving and higher levels of anger expression among drivers, while this was not the case for cyclists.
A note on identification in discrete choice models with partial observability

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Organisations: Department of Management Engineering, Systems Analysis, Transport DTU
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Assessment of physical and ecological space consumed by transport modes: A case of Rajkot city India

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A system dynamics case study of resilient response to IP theft from a cyber-attack

Undesirable changes in supply chain physical operations derived from disruptions in the transmission or storage of digital information are reported daily despite the Information Technology (IT) protection available. Once a disruption materializes, the company losses will depend on the coherence and swiftness of the supply chain response (resilience). However, current resilience frameworks are qualitative, do not address evolution over time as a relevant aspect, and thus do not provide indications on how to design a resilient response. This paper contributes to closing this gap by developing a system dynamics model from an actual case of resilient response after a cyber-attack. Both casespecific and generic structures are extracted from the case data analysis, and a reaction mechanism is proposed that results in the observed behavior. The identification of these structures should eventually aid decision makers in the process of designing a resilient supply chain response.
Bedre trafikuheldsdata: Danske erfaringer med brug af forskellige typer trafikuheldsdata

Viden om trafikuheld er en vigtig forudsætning for effektivt at kunne forbedre trafiksikkerheden, dels for at forstå de mekanismer, der ligger til grund for uheldenes opståen, dels for at kunne tilrettelægge målrettede uheldsforebyggende tiltag og dels for at kunne foretage en kvalificeret prioritering mellem forskellige tiltag, når det er påkrævet. Det er velkendt, at en stor andel af de trafikuheld, der finder sted, af forskellige grunde ikke registreres i den officielle, nationale trafikuheldsstatistik. Dette gælder i særlig grad eneuheld og cyklistuheld. Blandt fagpersoner med behov for faktuel viden om trafikuheld i Danmark har der derfor gennem snart mange år været et ønske om at forbedre datagrundlaget fx gennem inddragelse af andre datakilder som supplement til de politiregistrerede trafikuheldsdata. Trods en række forskellige lokale og regionale initiativer gennem årene er det imidlertid endnu ikke lykkedes at finde en national model for inddragelse af sådanne supplerende datakilder. Som led i processen mod et bedre datagrundlag for trafikuheld har Transport DTU/DTU Management Engineering, med støtte fra TrygFonden, gennemført nærværende projekt. Formålet har været at tilvejebringe et nationalt overblik over eksisterende datakilder vedr. trafikuheld, nuværende erfaringer med supplerende datakilder samt behov og forventninger blandt udvalgte interesserer vedrørende nuværende og fremtidig anvendelse af supplerende datakilder.


Benchmarking healthcare logistics processes: a comparative case study of Danish and US hospitals

Logistics processes in hospitals are vital in the provision of patient care. Improving healthcare logistics processes provides an opportunity for reduced healthcare costs and better support of clinical processes. Hospitals are faced with increasing healthcare costs around the world and improvement initiatives prevalent in manufacturing industries such as lean, business process reengineering and benchmarking have seen an increase in use in healthcare. This study investigates how logistics processes in a hospital can be benchmarked to improve process performance. A comparative case study of the bed logistics process and the pharmaceutical distribution process was conducted at a Danish and a US hospital. The
case study results identified decision criteria for designing efficient and effective healthcare logistics processes. The most important decision criteria were related to quality, security of supply and employee engagement. Based on these decision criteria, performance indicators were developed to enable benchmarking of logistics processes in healthcare. The study contributes to the limited literature on healthcare logistics benchmarking. Furthermore, managers in healthcare logistics are provided with a list of decision parameters relevant for designing and benchmarking processes.
Bin-packing problems with load balancing and stability constraints

The Bin-Packing Problem (BPP) is one of the most investigated and applicable combinatorial optimization problems. The problem consists of packing objects of different sizes into a finite number of similar bins, such that the number of used bins is minimized. Applications of the bin-packing problem appear in a wide range of disciplines, including transportation and logistics, computer science, engineering, economics, and manufacturing. The problem is well-known to be NP-hard and difficult to solve in practice, especially when dealing with the multi-dimensional cases. Closely connected to the BPP is the Container Loading Problem (CLP), which addresses the optimization of a spatial arrangement of cargo inside a container or transportation vehicle, with the objective to maximize the value of the cargo loaded or the volume utilization. The CLP focuses on a single container, and has been extended in the literature to handle a variety of different constraints arising from real-world problems. Consider for example the problem of arranging items into an aircraft cargo area such that the barycenter of the loaded plane is as close as possible to an ideal point given by the aircraft's specifications. The position of the barycenter has an impact on the flight performance in terms of safety and efficiency, and even a minor displacement from the ideal barycenter can lead to a high increase of fuel consumption [1]. Similar considerations apply when loading trucks and container ships. The aim of this work is to integrate realistic constraints related to e.g. load balancing, cargo stability and weight limits, in the multi-dimensional BPP. The BPP poses additional challenges compared to the CLP due to the supplementary objective of minimizing the number of bins. In particular, in section 2 we discuss how to integrate bin-packing and load balancing of items. The problem has only been considered in the literature in simplified versions, e.g. balancing a single bin or introducing a feasible region for the barycenter. In section 3 we generalize the problem to handle cargo stability and weight constraints.
Comparing three methods for participatory simulation of hospital work systems

Summative Statement: This study compared three participatory simulation methods using different simulation objects: Low resolution table-top setup using Lego figures, full scale mock-ups, and blueprints using Lego figures. It was concluded the three objects by differences in fidelity and affordance addressed different elements of a hospital work system.

Problem statement: Different methods for simulating the future work system for healthcare professionals have been applied in a number of green field and renovation design projects of hospitals in Denmark. The methods differed in the type of simulation objects representing the work system. Hence, this was an opportunity to study if these differences influenced which elements of a work system were in focus when healthcare professionals simulated and evaluated future work. Preliminary observations indicated this was the case but it was not understood how and why this influence took place.

Research Objective / Question: How does the simulation object influence which elements of a work system are being evaluated in participatory simulation events?

Methodology: Observation notes and video recordings of three types of simulation events using different objects were analyzed in respect to which elements of a work system were being targeted. A work system was defined as consisting of human work practices embedded in the three interdependent dimensions: space, organization and technology. All simulation events were based on participants playing clinical scenarios using the objects.

Results: Full scale mock-ups significantly addressed the local space and technology/tool elements of a work system. In contrast, the table-top simulation object addressed the organizational issues of the future work system. The blueprint based simulation addressed the organizational issues in combination with a global space outlook, e.g. the layout of an entire department.

Discussion: It is proposed that the simulation objects influence on work system focus is based on two attributes: Fidelity and affordance. Fidelity concerns the degree of resolution or the level of detail of what are being manifested by the simulation object. The affordance is a property of the object concerning how simulation participants will perceive how it may be used. When having a low-resolution model of a work system as in the table-top setup it is much easier to test a number of “what if” scenarios on how to organize the work in different spatial layouts. In addition to the object attributes other factors may play a role in what work system elements are being addressed. An important one seems to be at which point in the hospital design process the simulation is carried out.

Conclusions: Different simulation objects may to a certain degree influence what part of a work system is being addressed in participatory simulation events. For human factors practitioners in hospital design projects it is important to pay attention to this when planning and facilitating simulation events to evaluate different designs.
Comparison between young male drivers' self-assessed and objectively measured driving skills

Self-assessment of skills is a self-generated feedback process that contributes to confidence in one's skills. The higher one's self-assessed skills, the more likely one is to feel competent a particular domain thereby influencing the related behaviors. Drivers' self-assessed driving skills are not always accurate, which may cause serious problems such as underestimation of risk, reckless driving and accidents. Most previous research on self-assessment of driving skills did not compare self-reported skills to objectively measured driving skills, so the aim of this study was to test the accuracy of young male drivers' self-assessments of driving skills using a driving simulator, and to examine whether self-assessment accuracy varied with driving skill, experience or sensation-seeking propensity. Results showed that the drivers' self-assessments were inconsistent with their driving performance, and this inconsistency varied with driving skill, driving experience and sensation-seeking propensity in a safety-critical way.

Considering built environment and spatial correlation in modelling pedestrian injury severity

This study looks at mitigating and aggravating factors that are associated with the injury severity of pedestrians when they have crashes with another road user and overcomes existing limitations in the literature by posing attention on the built environment and considering spatial correlation across crashes. Reports for 6539 pedestrian crashes occurred in Denmark between 2006 and 2015 were merged with geographic information system resources containing detailed information about built environment and exposure at the crash locations. A linearised spatial logit model estimated the probability of pedestrians to sustain a severe or fatal injury conditional on the occurrence of a crash with another road user. This study confirms previous findings about older pedestrians and intoxicated pedestrians being the most vulnerable road users, and crashes with heavy vehicles and in roads with higher speed limits being related to the most severe outcomes. This study provides also novel perspectives by showing positive spatial correlation of crashes with the same...
severity outcome and emphasising the role of the built environment in the proximity of the crash. This study emphasises the need for thinking about traffic calming measures, illumination solutions, road maintenance programs and speed limit reductions. Moreover, this study emphasises the role of the built environment, as shopping areas, residential areas, and walking traffic density are positively related to a reduction in pedestrian injury severity. Often, these areas have in common a larger pedestrian mass that is more likely to make other road users more aware and attentive, while the same does not seem to apply to areas with lower pedestrian density.

**General information**

**State:** Published  
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**Considering passenger and operator inconvenience in the scheduling of large railway projects**

The continued development and renewal of railway infrastructure and technology is necessary to enable railway operators to provide high quality services subject to ever increasing demand. However, the execution of large infrastructure projects causes disturbances in the network due to the occupation of infrastructure over extended periods of time. In this paper we propose a multiobjective project scheduling optimization model for railway infrastructure projects that takes inconvenience caused to users of the infrastructure into account. We illustrate how the model can be used in an interactive way by planners based on their preferences, and we show that Pareto optimal solutions can be found in reasonable time using instances with realistic features. The result is a decision support model to aid infrastructure project planners in ensuring that passenger and operator inconvenience are also taken into account.

**General information**

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Cyklistuheld – hvilken betydning har vejen, køretøjet og trafikanten

Delay estimation on a railway-line with smart use of micro-simulation

This paper formulates a delay propagation model that estimates total railway line delay as a polynomial function of a single primary delay. The estimate is derived from a finite series of delays over a horizon that spans two dimensions: the length of the railway line and the number of trains in the service plan. The paper shows that the total delay estimate is a cubic relation for small primary delays.

A probabilistic approach is presented to combine the total delay functions of primary delays given to different trains. The final estimate is the total delay on railway lines, after a random incident has occurred. The model can be integrated in railway timetable analysis to reduce the number of necessary simulations, and can be used when the computation speed is an issue, such as on-line rescheduling algorithms. The model is demonstrated with an analysis of a Danish suburban railway.

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Demand pattern analysis of taxi trip data for anomalies detection and explanation

Due to environmental and economic stress, strong investment exists now towards adaptive transport systems that can efficiently utilize capacity, minimizing costs and environmental impacts. The common vision is a system that dynamically changes itself (the supply) to anticipate traveler needs (the demand). In some occasions, unexpected and unwanted demand patterns are noticed in the traffic network that lead to system failures and cost implications. Significantly low speeds or excessively low flows at an unforeseeable time are only some of the phenomena that are often noticed and need to be explained for transport system’s better future response. The objective of this research is the formulation of a proper methodology that identifies anomalies on traffic networks and correlates them with special events using internet data. Our main subject of interest is the investigation of why traffic congestion is happening as well as why there are demand fluctuations in days were there are no apparent reasons for the occurrence of such phenomena. We evaluated our system using Google’s NYC taxi trips public dataset. We defined initially the “normality” baseline and thereunder we studied individual days’ demand patterns for outliers’ detection. Our approach enabled us to detect demand fluctuations,
analyze and correlate them with disruptive events scenarios like extreme weather conditions, public holidays, religious festivities and parades. Using kernel density analysis, the affected areas as well as the significance of the observed differences compared to the average day are depicted.

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Den langsigtede effekt af husstandsindkomst på pendlingsafstand
Urbaniseringen i Danmark har været kraftig i det sidste årti, hvor flere større byer har oplevet eksplosiv vækst. Dette har blandt andet skabt en øget interesse for danskernes pendlingsmønstre og den regionale indkomstfordeling. I dette temahæfte analyserer vi den langsigtede effekt af husstandsindkomst på pendlingsafstand.

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Developing a model for measuring fear of pain in Norwegian samples: The Fear of Pain Questionnaire Norway
Fear of pain is highly correlated with pain report and physiological measures of arousal when pain is inflicted. The Fear of Pain Questionnaire III (FPQ-III) and The Fear of Pain Questionnaire Short Form (FPQ-SF) are self-report inventories developed for assessment of fear of pain (FOP). A previous study assessed the fit of the FPQ-III and the FPQ-SF in a Norwegian non-clinical sample and proved poor fit of both models. This inspired the idea of testing the possibility of a Norwegian FOP-model. A Norwegian FOP-model was examined by Exploratory Factor Analysis (EFA) in a sample of 1112 healthy volunteers. Then, the model fit of the FPQ-III, FPQ-SF and the Norwegian FOP-model (FPQ-NOR) were compared by Confirmatory Factor Analysis (CFA). Sex neutrality was explored by examining model fit, validity and reliability of the 3 models amongst male and female subgroups. The EFA suggested either a 4-, a 5- or a 6-factor model. The eigenvalue criterion supported the suggested 6-factor model, which also explained most of the variance and was most interpretable. A CFA confirmed that the 6-factor model was better than the two 4- and 5-factor models. Furthermore, the CFA used to test the fit of the FPQ-NOR, the FPQ-III and the FPQ-SF showed that the FPQ-NOR had the best fit of the 3 models, both in the whole sample and in sex sub-groups. A 6-factor model for explaining and measuring FOP in Norwegian samples was identified and termed the FPQ-NOR. This new model constituted six factors and 27 items, conceptualized as Minor, Severe, Injection, Fracture, Dental, and Cut Pain. The FPQ-NOR had the best fit overall and in male- and female subgroups, probably due to cross-cultural differences in FOP. This study highlights the importance on exploratory analysis of FOP-instruments when applied to different countries or cultures. As the FPQ-III is widely used in both research and clinical settings, it is important to ensure that the models construct validity is high. Country specific validation of FOP in both clinical and non-clinical samples is recommended.
Discrete choice models for commuting interactions
An emerging quantitative spatial economics literature models commuting interactions by a gravity equation that is mathematically equivalent to a multinomial logit model. This model is widely viewed as restrictive because of the independence of irrelevant alternatives (IIA) property that links substitution behavior in response to changes in the attractiveness of choice alternatives to choice probabilities in a mechanistic way. This is relevant for counterfactual analysis. In this paper we examine the appropriateness of the commuting model from a theoretical as well as an empirical point of view. We show that conventional specification tests of the multinomial logit model are of limited use when alternative specific constants are used, as is common in the recent literature, and offer no information with respect to the validity of IIA. In particular, we show that maximum likelihood estimation of relevant nested logit model is impossible because the crucial parameters are not identified. We discuss cross-nested and mixed logit as alternatives. We argue that a comparison between predicted and actual changes in commuting flows in response to a change in the attractiveness of choice alternatives provides a more informative test for the validity of the multinomial logit model for commuting interaction and report the results of such a test – as well as others – for data referring to Copenhagen.

Dynamic queuing transmission model for dynamic network loading
This paper presents a new macroscopic multi-class dynamic network loading model called Dynamic Queuing Transmission Model (DQTM). The model utilizes ‘good’ properties of the Dynamic Queuing Model (DQM) and the Link Transmission Model (LTM) by offering a DQM consistent with the kinematic wave theory and allowing for the
representation of multiple vehicle classes, queue spillbacks and shock waves. The model assumes that a link is split into a moving part plus a queuing part, and that traffic dynamics are given by a triangular fundamental diagram. A case-study is investigated and the DQTM is compared with single-class LTM, single-class DQM and multi-class DQM. Under the model assumptions, single-class models indicate that the LTM and the DQTM give similar results and that the shock wave property is properly included in the DQTM, while the multi-class models show substantially different travel times for two vehicle classes. Moreover, the results show that the travel time will be underestimated without considering the shock wave property.

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Dynamisk vejvalgsmodel for Hovedstadsområdet

Trængselsniveauet i Hovedstadsområdet er stigende. Dette medfører store udsving i trafikmængder og hastigheder over daget og myldretidene, men dette repræsenteres ikke i traditionelle statiske modeller. Dynamiske modeller opererer på et langt større detaljeringsniveau og modellerer sådanne udsving på realistisk vis. Der er netop blevet udviklet en dynamisk vejvalgsmodel for Hovedstadsområdet, og artiklen præsenterer de indledende resultater.

Effekten af autonome og selvkørende biler på kortere og lang sigt


Der er i Danmark og USA enighed om, at helt autonome køretøjer vil være på markedet fra 2030-35, hvorved de vil de være slået igennem i stort set hele bilparken om ca. 50 år. Men inden for 10 år vil en del nye biler være selvkørende på niveau 4, og dermed vil de teknisk set kunne det samme som autonome køretøjer. Muligvis vil der endda være godkendte autonome minibusser på vejene inden for 10 år. Det bør derfor allerede inden for 5 år overvejes, hvordan udviklingen i bilparken kan udfyldes til fordel for samfundet, og hvilke krav det politisk vil være relevant at stille til godkendelse af autonome køretøjer. Allerede i dag ved vi stort set, hvad autonome og selvkørende biler basalt set må forventes at kunne. Det interessante er derfor, hvilken effekt disse egenskaber vil have på trafikken, trængslen, vores byer, behov for infrastruktur osv.
Empirical analyses of a choice model that captures ordering among attribute values

In most choice models, the evaluation of attributes depends on differences of attribute values. Some research, mainly in marketing and psychology, suggests that the differences do not give the full picture of how decision makers evaluate choice alternatives, e.g. some decision makers may penalise an alternative additionally because it has the highest price. In this paper, we specify a discrete choice model that takes into account the ordering of attribute values across alternatives. This model is used to investigate the effect of attribute value ordering in three case studies related to alternative-fuel vehicles, mode choice, and route choice. In our application to choices among alternative-fuel vehicles, we see that especially the price coefficient is sensitive to changes in ordering. The ordering effect is also found in the applications to mode and route choice data where both travel time and cost sensitivities are affected by the ordering. Overall, the ordering effects have implications for both parameter estimates and the evaluation of willingness-to-pay measures.
Enabling Bus Transit Service Quality Co-Monitoring Through Smartphone-Based Platform

The growing ubiquity of smartphones offers public transit agencies an opportunity to transform ways to measure, monitor, and manage service performance. The potential of a new tool is demonstrated for engaging customers in measuring satisfaction and co-monitoring [Editor’s note: This is the authors’ word, meaning “agencies using public feedback to supplement official monitoring and regulation.”] bus service quality. The pilot project adapted a smartphone-based travel survey system, Future Mobility Sensing, to collect real-time customer feedback and objective operational measurements on specific bus trips. The system used a combination of GPS, Wi-Fi, Bluetooth, and accelerometer data to track transit trips while soliciting users’ feedback on trip experience. Though not necessarily intended to replace traditional monitoring channels and processes, these data can complement official performance monitoring through a more real-time, customer-centric perspective. The pilot project operated publicly for 3 months on the Silver Line bus rapid transit in Boston, Massachusetts. Seventy-six participants completed the entrance survey; half of them actively participated and completed more than 500 questionnaires while on board either at the end of a trip, at the end of a day, or both. Participation was biased toward frequent Silver Line users, the majority of whom were white and of higher income. Indicative models of user-reported satisfaction reveal some interesting relationships, but the models can be improved by fusing the app-collected data with actual performance characteristics. Broader and more sustained user engagement remains a critical future challenge.
Environmental impacts of electricity self-consumption from organic photovoltaic battery systems at industrial facilities in Denmark
Organic photovoltaics (OPV) show promise of greatly improving the environmental and economic performance of PV compared to conventional silicon. Life cycle assessment studies have assessed the environmental impacts of OPV, but not under a self-consumption scheme for industrial facilities. We investigate the life cycle environmental impacts of electricity self-consumption from an OPV system coupled with a sodium/nickel chloride battery at an iron/metal industry in Denmark. Results show that an OPV system without storage could decrease the carbon footprint of the industry; installation of the battery increases climate change and human toxicity impacts. We discuss sensitive modelling parameters and provide recommendations.
Environmental impacts of future urban deployment of electric vehicles: Assessment framework and case study of Copenhagen for 2016-2030

To move towards environmentally-sustainable transport systems, electric vehicles (EVs) are increasingly seen as viable alternatives to internal combustion vehicles (ICVs). To ensure effectiveness of such deployment, holistic assessments of environmental impacts can help decision-makers determine optimised urban strategies in a long-term perspective. However, explicit guidance and conduct of such assessments are currently missing. Here, we therefore propose a framework using life cycle assessment that enables the quantification of environmental impacts of a transport system at full urban scale from a fleet-based, foresight perspective. The analysis of the passenger car fleet development in the city of Copenhagen for the years 2016-2030 is used as a proof-of-concept. We modelled and compared five powertrain technologies, and we assessed four fleet-based scenarios for the entire city. Our results showed relative environmental benefits from range-extended and fuel-cell EVs over ICVs and standard EVs. These results were found to be sensitive to local settings, like electricity grid mix, which could alter the relative environmental performances across EV technologies. The comprehensive framework developed here can be applied to other geographic areas and contexts to assess the environmental sustainability of transport systems.
Er vejvrede en uheldsfaktor

En ny undersøgelse fra Canada viser, at bilister der udviser aggression, når de kører bil, i højere grad er involveret i færdselsuheld end bilister, der ikke udviser aggression, er. Dette gælder også for bilister, der kun udviser mindre alvorlige
former for aggression som fx at bande, lave fagter eller råbe ad andre trafikanter. Der mangler dog stadig viden om, hvorfor aggression i trafikken giver øget uheldsrisiko.

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Et nyt boligprisindeks for Storkøbenhavn

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Europæernes rejsevaner belyst igennem Ferie- og Forretningsrejseundersøgelserne

Analysen af udviklingen i rejseaktivitet viser en samlet indkomstelasticitet på 1,8 for alle land under ét, og væsentlig over 1 for de 3 grupper hver for sig. Et muligt mætningspunkt i udviklingen diskuteres. Dette foreslås at ligge ved at ca. 90% af befolkningen rejser udenlands årligt og har ca 2 rejser i gennemsnit. Men hertil kommer de kortere rejser, typisk weekendrejser, som ikke er analyseret i detaljer i dette paper.

**General information**
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Christensen, L. (Intern), Nielsen, O. A. (Intern)
Number of pages: 15
Publication date: 2017
Conference: Trafikdage 2017, Aalborg, Denmark, 28/08/2017 - 28/08/2017
Main Research Area: Technical/natural sciences

**Publication information**
Journal: Selected Proceedings from the Annual Transport Conference at Aalborg University
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BFI (2016): BFI-level 1
BFI (2015): BFI-level 1
BFI (2014): BFI-level 1
BFI (2013): BFI-level 1
ISI indexed (2013): ISI indexed no
BFI (2012): BFI-level 1
ISI indexed (2012): ISI indexed no
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
BFI (2009): BFI-level 1
BFI (2008): BFI-level 1
Original language: Danish
Electronic versions:
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Source: PublicationPreSubmission
Source-ID: 141915845
Publication: Research - peer-review › Conference article – Annual report year: 2017
Event characteristics that disrupt transport system's balance

The life of the city is often reflected in traffic patterns: popular sporting events draw crowds, holidays create disruptions, protests may result in road closures, etc. Decades of research on travel demand and network modelling already provide satisfying predictive tools. However, the main research focus has been on regular behaviour, such as peak/off-peak cycles, regular functioning of the infrastructure, and normal weather conditions. Consequently, non-recurrent events
severely challenge such models. Under non-recurrent circumstances, the typically expected correlation structures (e.g. between demand flows in neighbor areas; between current and recent values of traffic speeds or travel times) are drastically affected, severely affecting predictions. It is therefore necessary to take into consideration data from different sources. The objective of this research is the development of a methodology that correlates high taxi demand observations with popular events retrieved from Social Media platforms. Using NYC taxi trips public dataset, the average demand of the day was determined using kernel density analysis. Days that showed significant outliers compared to the average day were further studied using a dataset of around 116000 events. The second dataset was retrieved from the Web for the same 6 months period through the direct use of APIs. The correlation step includes the comparison of spatial and temporal kernel density depiction of taxi pick-up locations and events retrieved details. Through the correlation evaluation of traffic data and semantic information, conclusions were made on how the demand of taxi pick-ups changes based on certain event characteristics.

**General information**

State: Published  
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling  
Authors: Markou, I. (Intern), Rodrigues, F. (Intern), Pereira, F. C. (Intern)  
Number of pages: 10  
Publication date: 2017

**Host publication information**

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Main Research Area: Technical/natural sciences  
Conference: mobil.TUM 2017 - Intelligent Transport Systems in Theory and Practice, Munich, Germany, 04/07/2017 - 04/07/2017  
Source: PublicationPreSubmission  
Source-ID: 142689102  
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**Exploring the dynamics of firm and innovation community collaboration: A complex love story**

The classic fairy tale of The Little Mermaid (Andersen 1836) tells the story of the little mermaid falling in love with a prince from the unknown and different world over the sea inhabited by humans. She tries to access this world by exchanging her voice for a pair of human legs. Although she accepts the fierce pain of walking, she can never fully transcend the boundaries of their separate worlds and when the prince does not return her love, she dissolves into foam. However, instead of ceasing to exist, the little mermaid transforms into a new spiritual form floating above the stars. She will never be able to be with her prince and satisfy her desire for the human world, but her transformation renders it possible to obtain an immortal soul and rise up into the kingdom of God.

**General information**

State: Published  
Organisations: Department of Management Engineering, Transport DTU, University of Cambridge  
Authors: Dragsdahl Lauritzen, G. (Ekstern), Salomo, S. (Intern)  
Pages: 17-41  
Publication date: 2017

**Host publication information**

Title of host publication: Revolution of Innovation Management : The Digital Breakthrough  
Main Research Area: Technical/natural sciences  
ISBN (Print): 978-1-137-57474-9  
DOIs: 10.1057/978-1-137-57475-6_2  
Source: FindIt  
Source-ID: 2358208393  
Publication: Research - peer-review › Book chapter – Annual report year: 2017

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**Framework to Define Structure and Boundaries of Complex Health Intervention Systems: The ALERT Project**

Health intervention systems are complex and subject to multiple variables in different phases of implementation. This constitutes a concrete challenge for the application of translational science in real life. Complex systems as health-oriented interventions call for interdisciplinary approaches with carefully defined system boundaries. Exploring individual components of such systems from different viewpoints gives a wide overview and helps to understand the elements and the relationships that drive actions and consequences within the system. In this study, we present an application and assessment of a framework with focus on systems and system boundaries of interdisciplinary projects. As an example on how to apply our framework, we analyzed ALERT [an integrated sensors and biosensors’ system (BEST) aimed at monitoring the quality, health, and traceability of the chain of the bovine milk], a multidisciplinary and interdisciplinary project based on the application of measurable biomarkers at strategic points of the milk chain for improved food security
(including safety), human, and ecosystem health (1). In fact, the European food safety framework calls for science-based support to the primary producers’ mandate for legal, scientific, and ethical responsibility in food supply. Because of its multidisciplinary and interdisciplinary approach involving human, animal, and ecosystem health, ALERT can be considered as a One Health project. Within the ALERT context, we identified the need to take into account the main actors, interactions, and relationships of stakeholders to depict a simplified skeleton of the system. The framework can provide elements to highlight how and where to improve the project development when project evaluations are required.

**General information**

State: Published
Organisations: National Food Institute, Research Group for Genomic Epidemiology, Transport DTU, Department of Management Engineering, Quantitative Sustainability Assessment, Istituto Superiore di Sanita, University of Zurich
Authors: Boriani, E. (Intern), Esposito, R. (Ekstern), Frazzoli, C. (Ekstern), Fantke, P. (Intern), Hald, T. (Intern), R. Rüegg, S. (Ekstern)
Number of pages: 12
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Main Research Area: Technical/natural sciences

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Scopus rating (2016): SNIP 0
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10.3389/fpubh.2017.00182
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Source-ID: 2372608716
Publication: Research - peer-review › Journal article – Annual report year: 2017

**Future-Oriented LCA**

LCA is often applied for decision-making that concerns actions reaching near or far into the future. However, traditional life cycle assessment methodology must be adjusted for the prospective and change-oriented purposes, but no standardised way of doing this has emerged yet. In this chapter some challenges are described and some learnings are derived. Many of the future-oriented LCAs published so far perform relatively short-term prediction of simple comparisons. But for more long-term time horizons foresight methods can be of help. Scenarios established by qualified experts about future technological and economic developments are indispensable in future technology assessments. The uncertainties in future-oriented LCAs are to a large extent qualitative and it is important to emphasise that LCA of future technologies will provide a set of answers and not ‘the’ answer.

**General information**

State: Published
Organisations: Department of Management Engineering, Quantitative Sustainability Assessment, Technology and Innovation Management, Transport DTU
Authors: Olsen, S. I. (Intern), Borup, M. (Intern), Andersen, P. D. (Intern)
Pages: 499-518
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Source: FindIt
Source-ID: 2373522917
Publication: Research - peer-review › Book chapter – Annual report year: 2017
Goal Definition
The goal definition is the first phase of an LCA and determines the purpose of a study in detail. This chapter teaches how to perform the six aspects of a goal definition: (1) Intended applications of the results, (2) Limitations due to methodological choices, (3) Decision context and reasons for carrying out the study, (4) Target audience, (5) Comparative studies to be disclosed to the public and (6) Commissioner of the study and other influential actors. The instructions address both the conduct and reporting of a goal definition and are largely based on the ILCD guidance document (EC-JRC in European Commission—Joint Research Centre—Institute for Environment and Sustainability: International Reference Life Cycle Data System (ILCD) Handbook—General Guide for Life Cycle Assessment—Detailed Guidance. Publications Office of the European Union, Luxembourg 2010).

General information
State: Published
Organisations: Department of Management Engineering, Quantitative Sustainability Assessment, Transport DTU
Authors: Bjørn, A. (Intern), Laurent, A. (Intern), Owsianiak, M. (Intern), Olsen, S. I. (Intern)
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Series: Life Cycle Assessment
Main Research Area: Technical/natural sciences
Business and Management, Sustainability Management, Sustainable Development, Renewable and Green Energy, Manufacturing, Machines, Tools, Operating Procedures, Materials Treatment
DOIs: 10.1007/978-3-319-56475-3_7
Source: FindIt
Source-ID: 2373522935
Publication: Research - peer-review › Book chapter – Annual report year: 2017

Har kørebanens bredde betydning for trafikanters adfærd?
En ny undersøgelse fra Tyskland viser, at bredden af venstre kørebane på motorvejsstrækninger med vejarbejde har betydning for trafikanternes adfærd. Jo smallere kørebanen er, jo langsommere kører trafikanterne og jo længere trækker de til højre. Det har dog samtidig den negative sideeffekt, at antallet af kollisioner mellem trafikanter i venstre og højre kørebane stiger.

General information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2017

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Newspaper: Nyhedsbrevet trafiksikkerhedsforskning
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Main Research Area: Technical/natural sciences
Links: http://www.trafiksikkerhedsforskning.dtu.dk/arkiv/nr-36/koerebanens-bredde?utm_source=newsletter&utm_media@mail&utm_campaign
Publication: Communication › Newspaper article – Annual report year: 2017

Harmonisering af retningslinjer vedrørende vejarbejde
Effektiv regulering af kørehastigheden er et vigtigt element for øget sikkerhed i forbindelse med vejarbejde. I et projekt med deltagelse fra flere europæiske lande har man lavet et overblik over anvendte virkemidler samt en vurdering af deres potentielle med hensyn til at kunne bidrage til at reducere kørehastigheden i forbindelse med vejarbejde. Projektet er tænkt som et første skridt i retning mod harmonisering af retningslinjer for hastighedsregulering ved vejarbejde inden for Europa.

General information
State: Published
Harnessing big data for estimating the energy consumption and driving range of electric vehicles

Analyzing the factors that affect the energy efficiency of vehicles is crucial to the overall improvement of the environmental efficiency of the transport sector, one of the top polluting sectors at the global level. This study analyses the energy consumption rate (ECR) and driving range of battery electric vehicles (BEVs) and provides insight into the factors that affect their energy consumption by harnessing big data from real-world driving. The analysis relied on four data sources: (i) driving patterns collected from 741 drivers over a two-year period; (ii) drivers’ characteristics; (iii) road type; (iv) weather conditions. The results of the analysis measure the mean ECR of BEVs at 0.183 kW h/km, underline a 34% increase in ECR and a 25% decrease in driving range in the winter with respect to the summer, and suggest the electricity tariff for BEVs to be cost efficient with respect to conventional ones. Moreover, the results of the analysis show that driving speed, acceleration and temperature have non-linear effects on the ECR, while season and precipitation level have a strong linear effect. The econometric model of the ECR of BEVs suggests that the optimal driving speed is between 45 and 56 km/h and the ideal temperature from an energy efficiency perspective is 14 °C. Clearly, the performance of BEVs highly depends on the driving environment, the driving patterns, and the weather conditions, and the findings from this study enlighten the consumers to be more informed and manufacturers to be more aware about the actual utilization of BEVs.
High Speed Rail: Implications for carbon emissions and biodiversity

Rail has traditionally been seen as ‘good’ for the environment, as it is fast and efficient with a low carbon footprint. With respect to HS2 in the UK, new environmental debates have arisen over the competing global objectives of reducing the carbon footprint of HSR and the need to maintain and enhance local biodiversity and habitat. This paper identifies, measures and comments on the longer term environmental consequences of major infrastructure decisions that have to be made today. Short term pragmatism is seen as the means by which these decisions are made, and this results in issues relating to the complexity and uncertainty in assessing future impacts being relegated to a secondary level of importance. Mitigation measures (and not alternative routes) are discussed, and the legacy value of HSR to future generations is based on notions of short term mobility and economic growth, and not on the lower levels of carbon emissions and biodiversity loss.

General information
State: Accepted/In press
Organisations: Department of Management Engineering, Operations Management, Transport DTU, University of Oxford
Authors: Cornet, Y. (Intern), Dudley, G. (Ekstern), Banister, D. (Ekstern)
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Main Research Area: Technical/natural sciences

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Journal: Case Studies on Transport Policy
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Web of Science (2018): Indexed yes
Scopus rating (2016): CiteScore 1.21 SJR 0.536 SNIP 0.806
Scopus rating (2015): SJR 0.378 SNIP 0.633 CiteScore 0.92
Scopus rating (2014): SJR 0.115 SNIP 0.045 CiteScore 0.14
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Source: FindIt
Source-ID: 2373370264
How indicative is a self-reported driving behaviour profile of police registered traffic law offences?

Although most motorised countries have experienced massive improvements in road safety over the last decades, human behaviour and differences in accident risk across sub-groups of drivers remains a key issue in the area of road safety. The identification of risk groups requires the identification of reliable predictors of safe or unsafe driving behaviour. Given this background, the aim of this study was to test whether driver sub-groups identified based on self-reported driving behaviour and skill differed in registered traffic law offences and accidents, and whether group membership was predictive of having traffic law offences. Sub-groups of drivers were identified based on the Driver Behaviour Questionnaire (DBQ) and the Driver Skill Inventory (DSI), while traffic offences and accidents were register-based (Statistics Denmark). The participants (N = 3683) were aged 18–84 years and randomly selected from the Danish Driving License Register. Results show that the driver sub-groups differed significantly in registered traffic offences but not in registered accidents. In a logistic regression analysis, the sub-group "Violating unsafe drivers" was found predictive of having a traffic offence, even when socio-demographic variables and exposure were controlled for. The most important predictive factor, however, was having a criminal record for non-traffic offences, while gender, living without a partner, and being self-employed also had a significant effect. The study confirms the use of the DBQ and DSI as suitable instruments for predicting traffic offences while also confirming previous results on accumulation of problematic behaviours across life contexts. The finding that driver sub-groups did not differ in registered accidents supports the recent research activities in finding and modelling surrogate safety measures.

General information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU, Transport Modelling, University of Queensland
Authors: Martinussen, L. M. (Intern), Møller, M. (Intern), Prato, C. G. (Intern), Haustein, S. (Intern)
Pages: 1-5
Publication date: 2017
Main Research Area: Technical/natural sciences

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Journal: Accident Analysis & Prevention
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Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.24 SJR 1.49 SNIP 1.97
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.206 SNIP 1.808 CiteScore 2.63
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.19 SNIP 2.067 CiteScore 2.79
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.359 SNIP 2.688 CiteScore 3.2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.3 SNIP 2.238 CiteScore 2.56
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.922 SNIP 2.008 CiteScore 2.61
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
The ongoing transition to a Circular Economy is changing the shape of Supply Chains. They are becoming more 'Closed-Loop', combining forward and reverse flows of products and materials. Reverse Supply Chains (RSCs), originally considered as a solution for handling waste or recovering residual value, can play a pivotal role in determining the competitive advantage of the firm. Firms do not always exploit the potential of the RSC, and the conditions allowing the exploitation remain unclear. This paper explores the alignment between the RSC and the competitive strategy of the firm. Results from seven case studies, focusing on original equipment manufacturers (OEMs), show how the RSC can play a strategic, tactical, or operational role for the firm. The paper applies for the first time the concept of strategic alignment to the RSC and practitioners can use the proposed framework to analyse the role of the RSC within their firm.
How the reverse supply chain impacts the financial performance of original equipment manufacturers

This thesis examines the financial impact of a firm's reverse supply chain (RSC). Specifically, the thesis examines the two questions of how the RSC can contribute to the financial performance of the firm and which factors are decisive for the RSC's financial contribution. The thesis focuses on original equipment manufacturers. The thesis results show that the RSC can contribute to the financial performance of the firm in more than 20 different ways, which the thesis defines as functions of the RSC. Examples of RSC-functions are 1) resale of recovered end-products to price-focused market segments in the firm's primary markets, 2) resale to customers in new markets (in e.g. emerging economies), and 3) sale of used materials back to the firm's original material suppliers. The firm's RSC can conduct several RSC-functions simultaneously and the financial benefits from operating these RSC-functions differ widely among functions. The factors that are decisive for the RSC's financial contribution depend on the type of RSC-function. For a RSC-function that recovers and resells end-products examples of factors decisive the function's financial contribution are 1) the market's willingness to pay for recovered products, 2) the firm's profits from servicing recovered products once sold, and 3) the added probability of selling additional products to the firm's customers from recovered products. The thesis demonstrates that manufacturers can achieve considerable financial contributions from the RSC, which contracts the traditional perception of the RSC in academic literature as well as with logistics practitioners.
How to use SVMAs to reduce the Carbon Pricing and Climate Finance Gap: numerical illustrations

A temporary gap is generated by the difference between the Social Value of Mitigation Activities (SVMA) and implementable carbon prices. A spectrum of options are available to handle this. These options encompass policy instruments that give different weights to ‘command and control’ measures and to economic incentives. We analyze here how to combine an explicit carbon price that rewards mitigation activities every year and a notional price embedded in devices that reward low carbon investments beforehand through lowering their risk-weighted capital costs. The latter option is essential in order to hedge against two uncertainties that adversely affect technologies having high capital costs. The first relates to technologies which are at the beginning or mid-way of their experience curve. The second relates to the net signal launched by explicit carbon prices given the presence of noises that swamp it. We first illustrate, based on five case studies, the equivalence curves between carbon prices and percentages of reduction of capital costs. We argue then that a notional price equated to the SVMA can maximize the economic efficiency of financial devices that reduce the capital costs of a low carbon project and we discuss the necessity of a world SVMA and national SVMA. We then introduce uncertainty in the analysis and show that contingent risks theoretically need carbon prices to grow to a level well beyond their political acceptability. Reducing the risk-weighted capital costs and rewarding upfront low-carbon investments at the present value of the SVMA is an efficient way of overcoming these barriers. Finally, we show, in the case of India, how to assess a national SVMA that includes the climate benefits and the development co-benefits of mitigation activities.

We then discuss how to articulate a World SVMA (paragraph 108 of the Paris Decision), national SVMAs and explicit carbon prices (in line with NDCs) to bridge the funding gap, tackle the ‘100G$ and +’ issue, and maximize the gains of cooperation around climate policies.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, UNEP DTU Partnership, Universidade Federal do Rio de Janeiro, CIRED
Authors: Hourcade, J. (Ekstern), Pryadarshi, S. (Ekstern), La Rovere, E. (Ekstern), Dhar, S. (Intern), Espagne, E. (Ekstern), Finon, D. (Ekstern), Pereira, A. (Ekstern), Pottier, A. (Ekstern)
Number of pages: 10
Publication date: 2017

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Links:

Bibliographical note
No 2017-61
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Working paper – Annual report year: 2017

How can man gøre ved vejvrede?
Det er ikke kun bilisten selv, der kan have gavn af tiltag, der reducerer forekomsten af vejvrede i trafikken. Også passagerer og andre trafikanter vil nyde godt af det, hvis forekomsten af pludselige, voldsomme og aggressive reaktioner i trafikken reduceres. I denne artikel skitseres forskellige tiltag til forebyggelse af vejvrede blandt bilister. Forskningen tyder
på, at tiltag kan reducere vejvrede, men der er endnu ikke grundlag for at udpege ét tiltag som det bedste.

**General information**  
State: Published  
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU  
Authors: Møller, M. (Intern)  
Publication date: 2017

**Publication information**  
Newspaper: Nyhedsbrevet trafiksikkerhedsforskning  
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Main Research Area: Technical/natural sciences  
Links:  
http://www.trafiksikkerhedsforskning.dtu.dk/arkiv/nr-38/hvad-kan-man-goere-ved-vejvrede  
Publication: Communication › Newspaper article – Annual report year: 2017

**Hvilke behov for støtte har ældre bilister, når de kører bil?**  
Den teknologiske udvikling har i de seneste år ført til udvikling af en række fører-støtte-systemer, der på forskellig måde kan hjælpe bilisten under kørslen. Det er muligt, at sådanne systemer også vil kunne være en hjælp for ældre bilister. En ny svensk undersøgelse viser, at systemer, der kan hjælpe ældre i situationer, hvor de er nødt til at dele deres opmærksomhed mellem forskellige trafikrelaterede ting, hjælpe dem under kørsel i tæt trafik, og som løbende kan give dem faktuel information fx om den aktuelle hastighedsgrænse, er relevante.

**General information**  
State: Published  
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU  
Authors: Møller, M. (Intern)  
Publication date: 2017

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No.: 37  
Main Research Area: Technical/natural sciences  
Links:  
http://www.trafiksikkerhedsforskning.dtu.dk/arkiv/nr-37/aeldre-bilisters-stoettebehov-under-koersel  
Publication: Communication › Newspaper article – Annual report year: 2017

**Improved formulations and an Adaptive Large Neighborhood Search heuristic for the integrated berth allocation and quay crane assignment problem**  
This paper focuses on the integrated berth allocation and quay crane assignment problem in container terminals. We consider the decrease in the marginal productivity of quay cranes and the increase in handling time due to deviation from the desired position. We consider a continuous berth, discretized in small equal-sized sections. A number of enhancements over the state-of-the-art formulation and an Adaptive Large Neighborhood Search (ALNS) heuristic are presented. Computational results reveal that the enhancements improve many of the best-known bounds, and the ALNS outperforms the state-of-the-art heuristics for many instances. We also conduct further analysis on a new larger benchmark.

**General information**  
State: Published  
Organisations: Department of Management Engineering, Management Science, Operations Research, Transport DTU  
Authors: Iris, C. (Intern), Pacino, D. (Intern), Røpke, S. (Intern)  
Pages: 123-147  
Publication date: 2017  
Main Research Area: Technical/natural sciences

**Publication information**  
Journal: Transportation Research. Part E: Logistics and Transportation Review  
Volume: 105  
ISSN (Print): 1366-5545  
Ratings:  
BFI (2018): BFI-level 2  
Web of Science (2018): Indexed yes  
BFI (2017): BFI-level 2
Improving Healthcare Logistics Processes

Healthcare costs are increasing due to an ageing population and more sophisticated technologies and treatments. At the same time, patients expect high quality care at an affordable cost. The healthcare industry has therefore experienced increasing pressures to reduce the cost of healthcare provision whilst providing high quality care. Logistics activities in hospitals provide a significant opportunity for cost containment in healthcare through the implementation of best practices.

Literature provides little guidance on how to improve healthcare logistics processes. This study investigates logistics processes in hospitals and aims to provide theoretically and empirically based evidence for improving these processes to both expand the knowledge base of healthcare logistics and provide a decision tool for hospital logistics managers to improve their processes.

Case studies were conducted at hospitals in Denmark and the US investigating three different types of processes: bed logistics, hospital cleaning, and pharmaceutical distribution. Based on an analysis and comparison of the case studies, a set of factors were identified influencing the decision on how to improve healthcare logistics processes. Furthermore, a method for benchmarking healthcare logistics processes was developed. Finally, a theoretically and empirically founded framework was developed to support managers in making an informed decision on how to improve healthcare logistics processes.

This study contributes to the limited literature concerned with the improvement of logistics processes in hospitals. Furthermore, the developed framework provides guidance for logistics managers in hospitals on how to improve their processes given the circumstances in which they operate.

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Operations Management, Transport DTU, Copenhagen University Hospital
Improving substance information in usetox®, part 2: Data for estimating fate and ecosystem exposure factors

The scientific consensus model USEtox® is developed since 2003 under the auspices of the UNEP-SETAC Life Cycle Initiative as a harmonized approach for characterizing human and freshwater toxicity in life cycle assessment (LCA) and other comparative assessment frameworks. Using physicochemical substance properties, USEtox® quantifies potential human toxicity and freshwater ecotoxicity impacts by combining environmental fate, exposure and toxicity effects information, considering multimedia fate and multi-pathway exposure processes. The main source to obtain substance properties for USEtox® 1.01 and 2.0 is the Estimation Program Interface (EPI SuiteTM ) from the U.S. Environmental Protection Agency. However, since the development of the original USEtox® substance databases, new chemical regulations have been enforced in Europe such as the REACH and the Plant Protection Products regulations. These regulations require that a chemical risk assessment for humans and the environment is performed before a chemical is placed on the European market. Consequently, additional physicochemical property data and new toxicological end-points are now available for thousands of chemical substances. The aim of the present study is to explore to which extent the new available data can be used as input for USEtox® - especially for application in Environmental Footprint studies - and to discuss how this would influence the quantification of fate and exposure factors. Initial results show that the choice of data source and the parameters selected can greatly influence fate and exposure factors leading to potentially different rankings and relative contributions of substances to overall human toxicity and ecotoxicity impacts. Moreover, it is crucial to discuss the relevance of exposure factor for freshwater ecotoxicity impacts particularly for persistent highly adsorbing and bio-accumulating substances. This article is protected by copyright. All rights reserved.
Inclusive planning in transport and energy STI-policies

Transition to a more sustainable and fossil-free energy system is of global interest, and implies social challenges for the developed world including the European Union. In particular, the energy consumption related to transport constitutes a significant challenge. If not serious changes are made the transport sector can lead to more than a doubling of CO2 emissions by 2050 (Edenhofer et al., 2014). Transport in this context includes transport of both people and goods, and it includes transport on land, sea and air. Responsible research
and innovation should take into account this large social challenge of securing a more sustainable and fossil-free energy system. Furthermore, responsible research and innovation should take into account both the required changes in all citizens' daily life due to this transition as well as the driving force of grassroot innovation movements.

**General information**

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Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Andersen, P. D. (Intern), Hansen, M. (Intern), Selin, C. L. (Intern)
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**India's INDC for transport and 2 C stabilization target**

Transport sector accounted for 13 % of India’s energy-related CO2 emissions. India’s Intended Nationally Determined Contributions (INDC) specify an economy wide decarbonization target of 33 to 35 % between 2005 and 2030 and includes announcements for urban transport, intercity transportation infrastructures, sustainable logistics and inland waterways to achieve these reductions. The Paris agreement that followed the announcement of the INDC increased the global ambition to stabilize the greenhouse gases so that maximum temperature rise is limited to 2 °C with an enhanced ambition for 1.5 °C. The paper analyses how far INDC will reduce the emissions from transport and to what extent a 2 °C temperature stabilization goal will decarbonize the transport sector. The analysis is carried out using ANSWER MARKAL model for evaluating the energy system in combination with a transport demand module to model future scenarios for India till year 2050. Three scenarios are explored in this paper: i) a business-As-usual scenario ii) an INDC scenario iii) implementation of INDC in a strong climate regime aiming for the 2 °C target. The assessment shows that CO2 reductions from transport would happen through a wide portfolio of options. The highest mitigation is achieved through sustainable mobility strategies, followed by fuel economy standards. Electric vehicles offer significant mitigation benefits, however these are more significant post 2030.
Integrated Optimisation for Public Transport System with Joint Schedule- and Frequency-Based Services

General information
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Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Jiang, Y. (Intern), Eltved, M. (Intern), Nielsen, O. A. (Intern), Rasmussen, T. K. (Intern)
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Event: Abstract from 22nd International Conference of Hong Kong Society for Transportation Studies, Hong Kong, China.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review » Conference abstract for conference – Annual report year: 2017

Integrated Rolling Stock Planning for Suburban Passenger Railways

One of the core issues for operators of passenger railways is providing sufficient number of seats for passengers while keeping operating costs at a minimum. The process a railway operator undertakes in order to achieve this is called rolling stock planning. Rolling stock planning deals with deciding how to utilise the fleet of available train units in space and time. In this thesis, rolling stock planning has been studied, using as case study DSB S-tog, the suburban passenger railway operator of the City of Copenhagen. At DSB S-tog, the rolling stock planning process is subdivided according to time horizon into two subprocesses. Firstly, there is the long-term circulation planning process, in which planning is conducted for anonymous, virtual train units months in advance. Secondly, there is the short-term train unit dispatching process, which covers the execution of the long term circulation plan. In the train unit dispatching process, the anonymous, virtual train units from the circulation planning process will have real, physical train units assigned to them. The train unit dispatching process has a short-term time horizon of days, hours and minutes and makes sure the actual, real-world train services are performed. Disruptions are also handled in this process. In the long term circulation planning phase of rolling stock planning, a large number of railway-specific requirements must be taken into account: The physical railway infrastructure must be adhered to, e.g., platform and depot track capacities, the rules of the train control system and the order in which train units may be parked so as not to obstruct each other's movements; All trains services of the timetable must have a least one train unit assigned; Only the available rolling stock can be used in the plan: The plan should provide seating capacity according to the passenger demand and provide an even distribution of flexible space for bicycles etc.; Planned shunting operations in the depot should have sucient personnel on duty; Train units must undergo interior and exterior cleaning, surface foil application and winter preparedness treatment at regular time intervals; At regular service distance intervals, train units must undergo scheduled maintenance etc., and consumables must be refilled; Certain train services must have train units with additional train control system equipment installed, special passenger counting equipment installed and/or perform predefined exposure of commercials.

In the short-term train unit dispatching phase of rolling stock planning, additional railwayspecific requirements include: Exterior graffiti removal and unscheduled maintenance on demand and sometimes within a given time frame; Make available train units to meet surveillance video recording requests from the police within a given time frame. Due to the large number of railway-specific requirements and their nature, rolling stock planning is traditionally conducted in a step-by-step manner, in which the individual planning processes are not integrated with each other. Needless to say, this yields rolling stock plans that are either suboptimal or infeasible with regard to the requirements. In this thesis it is shown that it is possible to design and implement a rolling stock planning model integrating into one planning process all the railway-specific requirements of DSB S-tog, all at the same time. This integrated rolling stock planning model is implemented using a greedy heuristic and makes use of the novel (train) unit order conservation principle, implemented as special side constraints to a resource constrained shortest path algorithm. The integrated rolling stock planning model is tested extensively on 15 real-world, manually constructed rolling stock plan data instances. When run on these instances, the greedy heuristic can achieve an average economic gain of approx. 2% with processing times in all cases less than 1 hour 20 minutes. In addition to this, the greedy heuristic can make typically infeasible rolling stock plans feasible within just a few minutes of processing time. Moreover, in this thesis a number of different economic net value upper bound calculation models are designed, implemented and tested. The net value upper bound calculation models implement the railway-specific requirements to a varying degree and consequently expose different properties with regard to tightness of bounds and processing times. The net value upper bound model having the highest degree of requirements integration adheres to 47% of the requirements by count. Using this tightest net value upper bound calculation model, it is shown that the greedy heuristic mentioned before is able to gain approx. 1/3 of the relative gap between the net value of the original, manual plans and the net value upper bound. Moreover, it is shown that in most cases, the net value of the original, manual plans already lie close to the upper bound.

Furthermore, a branch-and-price based matheuristic integrated rolling stock planning model is designed, implemented and tested. It is shown that this type of matheuristic model is able to adhere fully to all railway-specific requirements, and that the vast majority of requirements can be integrated into the optimisation steps of the aheuristic algorithm. The branch-and-price matheuristic model can solve small instances (e.g., in the form of matheuristic iterations) to optimality. Used in conjunction with the greedy heuristic, the two methods combined can achieve an additional small gain in objective value not achievable using each method by itself. With a yearly cost of the rolling stock operation in the hundreds of million DKK, the potential benefit of a real-world application of the models to DSB S-tog is in the order of several million DKK per year. In addition to this, a substantial benefit can be gained by the way the models can automate the current, manual planning procedures. This will enable planners to invest more creativity and meticulousness into the planning process as a result of
being liberated from manual planning procedures. For these reasons, DSB S-tog is eager to proceed with the real-world application of the models developed in this thesis.

**General information**
State: Published
Organisations: Management Science, Department of Management Engineering, Operations Research, Transport DTU, DSB - Danish State Railways, IBM Research
Authors: Thorlacius, P. (Intern), Larsen, J. (Intern), Groth, J. J. (Intern), Laumanns, M. (Ekstern)
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**Integrating environmental impacts into cost-benefit analysis: The value of environmental pollutants**

**General information**
State: Published
Organisations: Department of Management Engineering, Quantitative Sustainability Assessment, Transport DTU, Transport Modelling
Authors: Dong, Y. (Intern), Manzo, S. (Intern), Hauschild, M. Z. (Intern)
Number of pages: 1
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Event: Abstract from 9th biennial conference of the International Society for Industrial Ecology (ISIE) and the 25th annual conference of the International Symposium on Sustainable Systems and Technology (ISSST), Chicago, United States.
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Integrating environmental impacts into cost-benefit analysis- The value of environmental pollutants
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**Integrating police reports with geographic information system resources for uncovering multidimensional patterns of pedestrian crashes in Denmark**

**General information**
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Queensland, Technical University of Denmark
Authors: Prato, C. G. (Ekstern), Kaplan, S. (Intern), Patrier, A. (Ekstern), Rasmussen, T. K. (Intern)
Publication date: 2017
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Main Research Area: Technical/natural sciences
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**Integrating robust timetabling in line plan optimization for railway systems**
We propose a heuristic algorithm to build a railway line plan from scratch that minimizes passenger travel time and operator cost and for which a feasible and robust timetable exists. A line planning module and a timetabling module work iteratively and interactively. The line planning module creates an initial line plan. The timetabling module evaluates the line plan and identifies a critical line based on minimum buffer times between train pairs. The line planning module proposes a new line plan in which the time length of the critical line is modified in order to provide more flexibility in the schedule. This flexibility is used during timetabling to improve the robustness of the railway system. The algorithm is validated on the DSB S-tog network of Copenhagen, which is a high frequency railway system, where overtakings are not allowed. This network has a rather simple structure, but is constrained by limited shunt capacity. While the operator and passenger cost remain close to those of the initially and (for these costs) optimally built line plan, the timetable corresponding to the finally developed robust line plan significantly improves the minimum buffer time, and thus the robustness, in eight out of ten
studied cases.

**General information**

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Organisations: Department of Management Engineering, Management Science, Operations Research, Transport DTU, KU Leuven
Authors: Burggraeve, S. (Ekstern), Bull, S. H. (Intern), Vansteenwegen, P. (Ekstern), Lusby, R. M. (Intern)
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- BFI (2009): BFI-level 2
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- BFI (2008): BFI-level 2
- Scopus rating (2008): SJR 0.965 SNIP 2.492
- Scopus rating (2007): SJR 0.899 SNIP 1.518
- Scopus rating (2006): SJR 1.965 SNIP 2.7
- Scopus rating (2005): SJR 1.567 SNIP 3.134
- Scopus rating (2004): SJR 1.406 SNIP 2.78
- Scopus rating (2003): SJR 1.152 SNIP 1.901
- Scopus rating (2002): SJR 0.637 SNIP 1.987
- Scopus rating (2001): SJR 0.483 SNIP 1.044
- Scopus rating (2000): SJR 0.366 SNIP 1.222
- Scopus rating (1999): SJR 0.503 SNIP 2.032
Investigating the reasons behind the intention to report cycling crashes to the police and hospitals in Denmark

This study explores the factors underlying the reporting intentions of cycling crashes by looking at barriers to reporting from other contexts and eliciting them via a survey and a structural equation model (SEM). The barriers consist of the attitude that crash reporting is useless, the preference to allocate time to other activities, the concerns about family distress and social image, the distrust in the police, and the medical consultation aversion. The survey elicited the reasons as well as socio-economic characteristics, cycling habits and last crash experience of cyclists, and yielded 1512 complete responses that were used for SEM estimation. The empirical analysis revealed that: (i) distrust in the police and medical consultation aversion are related to the reporting intentions both directly and indirectly through the attitude that crash reporting is useless and the preferences to allocate time to other activities; (ii) medical consultation aversion has a higher weight than the distrust in the police in demotivating cycling crash reporting intentions; (iii) the reasons are all strongly related to cyclists' characteristics and last cycling crash characteristics; and (iv) information provision regarding the societal benefits of crash reporting is important for increasing the reporting rate. (C) 2016 Elsevier Ltd. All rights reserved.
Joint modeling of schedule- and frequency-based services in public transport assignment models

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Tetraplan A/S
Authors: Eltved, M. (Intern), Nielsen, O. A. (Intern), Rasmussen, T. K. (Intern), Frederiksen, R. (Ekstern)
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Publication: Research - peer-review › Conference abstract in proceedings – Annual report year: 2017

LCA of Chemicals and Chemical Products
This chapter focuses on the application of Life Cycle Assessment (LCA) to evaluate the environmental performance of chemicals as well as of products and processes where chemicals play a key role. The life cycle stages of chemical products, such as pharmaceuticals drugs or plant protection products, are discussed and differentiated into extraction of abiotic and biotic raw materials, chemical synthesis and processing, material processing, product manufacturing, professional or consumer product use, and finally end-of-life. LCA is discussed in relation to other chemicals management frameworks and concepts including risk assessment, green and sustainable chemistry, and chemical alternatives assessment. A large number of LCA studies focus on contrasting different feedstocks or chemical synthesis processes, thereby often conducting a cradle to (factory) gate assessment. While typically a large share of potential environmental impacts occurs during the early product life cycle stages, potential impacts related to chemicals that are found as ingredients or residues directly in products can be dominated by the product use stage. Finally, methodological challenges in LCA studies in relation to chemicals are discussed including the choice of functional unit, defining the system boundaries, quantifying emissions for many thousands of marketed chemicals, characterising emissions in terms of toxicity and other impacts, and finally interpreting LCA results. The chapter is relevant for LCA students and practitioners who wish to gain basic understanding of LCA studies of products or processes with chemicals as a key aspect.

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Organisations: Department of Management Engineering, Quantitative Sustainability Assessment, Transport DTU
LCA of Energy Systems

Energy systems are essential in the support of modern societies' activities, and can span a wide spectrum of electricity and heat generation systems and cooling systems. Along with their central role and large diversity, these systems have been demonstrated to cause serious impacts on human health, ecosystems and natural resources. Over the past two decades, energy systems have thus been the focus of more than 1000 LCA studies, with the aim to identify and reduce these impacts. This chapter addresses LCA applications to energy systems for generation of electricity and heat. The chapter gives insight into the LCA practice related to such systems, offering a critical review of (i) central methodological aspects, including the definition of the goals and scopes of the studies, their coverage of the system life cycle and the environmental impacts, and (ii) key findings of the studies, particularly aimed at identifying environmental hotspots and impact patterns across different energy sources. Based on this literature review recommendations and guidelines are issued to LCA practitioners on key methodological aspects that are important for a proper conduct of LCA studies of energy systems and thus ensuring the reliability of the LCA results provided to decision- and policy-makers.

Learning from participatory design projects across industries

Summative Statement: A preliminary framework for participatory design projects (PDP) was developed based on a retrospective analysis of five PDPs across different industries. The framework may serve as a guidance for planning and conducting PDPs.

Problem statement: A growing number of experiences with participatory design or participatory ergonomics projects have been gained within the field of macro-ergonomics. It is suggested that the Participatory Ergonomics Framework (PEF) validated by Haines et al. (2002) needs to be updated based on these experiences and hence more focussed on design activities.

Research Objective / Question: The objective of this study was to update and design-orient the PEF based on experiences with PDPs within the last ten years.

Methodology: Five participatory design projects across different industries were systematically analyzed and compared in order to develop a framework pointing to supportive theory and practical guidance for ergonomics practitioners. The five PDPs were based in the following industries: construction, public service, food processing, and two healthcare projects. The starting point for the analysis was the notion of work systems meeting each other in the intervention into design.
Results: The nine dimensions and categories in the framework by Haines et al. (2002) are still relevant. However, they are not entirely oriented towards design projects and the framework do not include the dynamics between the ergonomist/researcher and the design activities going on in a company. It is suggested to add the following dimensions to the PEF: Involved work systems, type of interaction between the ergonomist work system and the company design work systems, transfer and integration of results from PDPs into the overall design project in the company.

Discussion: The proposed update of the PEF introduces a dynamic understanding of PDPs by the notion that PDP’s may be seen as interactions between different work systems, including those of the ergonomist/researcher, company designers, consultants, and technology suppliers. By an initial mapping the relevant work systems, the intervention by ergonomists may be better planned and better ensure a real impact on the overall design project. This is of importance because many PDPs have an intermittent and temporary character. The notion of interaction between different work systems also allows for theories on how ergonomists/researchers can impact design projects by facilitating participatory schemes.

Conclusions: This study suggested an updating of the PEF in order to include the dynamics between an ergonomist work systems with its own goals and rationale and a number of company work systems involved in design projects and having other goals and rationales. The updated framework are aimed at guidance in planning and conduction PDPs.
Life Cycle Inventory Analysis

The inventory analysis is the third and often most time-consuming part of an LCA. The analysis is guided by the goal and scope definition, and its core activity is the collection and compilation of data on elementary flows from all processes in the studied product system(s) drawing on a combination of different sources. The output is a compiled inventory of elementary flows that is used as basis of the subsequent life cycle impact assessment phase. This chapter teaches how to carry out this task through six steps: (1) identifying processes for the LCI model of the product system; (2) planning and collecting data; (3) constructing and quality checking unit processes; (4) constructing LCI model and calculating LCI results; (5) preparing the basis for uncertainty management and sensitivity analysis; and (6) reporting.
Low Cost and Flexible UAV Deployment of Sensors
This paper presents a platform for airborne sensor applications using low-cost, open-source components carried by an easy-to-fly unmanned aircraft vehicle (UAV). The system, available in open-source, is designed for researchers, students and makers for a broad range of exploration and data-collection needs. The main contribution is the extensible architecture for modularized airborne sensor deployment and real-time data visualisation. Our open-source Android application provides data collection, flight path definition and map tools. Total cost of the system is below 800 dollars. The flexibility of the system is illustrated by mapping the location of Bluetooth beacons (iBeacons) on a ground field and by measuring water temperature in a lake.

General Information
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Organisations: Department of Management Engineering, Technology and Innovation Management, Copenhagen Center for Health Technology, Transport DTU, IT University of Copenhagen
Authors: Sørensen, L. Y. (Intern), Jacobsen, L. T. (Ekstern), Hansen, J. P. (Intern)
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Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.636 SNIP 1.705 CiteScore 2.4
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.627 SNIP 1.826 CiteScore 2.72
ISI indexed (2013): ISI indexed yes
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BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.668 SNIP 1.736 CiteScore 2.53
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 0.636 SNIP 1.488 CiteScore 2.44
ISI indexed (2011): ISI indexed yes
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BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.574 SNIP 1.196
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.525 SNIP 1.132
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Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.511 SNIP 0.946
Scopus rating (2006): SJR 0.515 SNIP 0.787
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Mobilitetspotentiale for Aarhus Letbane

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Authors: Barfod, M. B. (Intern), Kronbak, J. (Intern), Pedersen, T. R. (Intern), Larsen, R. (Intern), Olsen, A. (Ekstern)
Number of pages: 106
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Model-based corridor performance analysis – An application to a European case
The paper proposes a methodology for freight corridor performance monitoring that is suitable for sustainability assessments. The methodology, initiated by the EU-funded project SuperGreen, involves the periodic monitoring of a standard set of transport chains along the corridor in relation to a number of Key Performance Indicators (KPIs). It consists of decomposing the corridor into transport chains, selecting a sample of typical chains, assessing these chains through a set of KPIs, and then aggregating the chain-level KPIs to corridor-level ones using proper weights. A critical feature of this methodology concerns the selection of the sample chains and the calculation of the corresponding weights. After several rounds of development, the proposed methodology suggests a combined approach involving the use of a transport model for sample construction and weight calculation followed by stakeholder refinement and verification. The sample construction part of the methodology was tested on GreCOR, a green corridor project in the North Sea Region, using the Danish National Traffic Model as the principal source of information for both sample construction and KPI estimation. The results show that, to the extent covered by the GreCOR application, the proposed methodology can effectively assess the performance of a freight transport corridor. Combining the model-based approach for the sample construction and the study-based approach for the estimation of chain-level indicators exploits the strengths of each method and avoids their weaknesses. Possible improvements are also suggested by the paper.

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Scopus rating (2016): CiteScore 1.13 SJR 0.536 SNIP 0.662
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Scopus rating (2015): SJR 0.493 SNIP 0.791 CiteScore 1.17
Web of Science (2015): Indexed yes
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Scopus rating (2014): SJR 0.59 SNIP 0.623 CiteScore 1.06
Modelling production-consumption flows of goods in Europe: the trade model within Transtools3

The paper presents a new model for trade flows in Europe that is integrated with a logistics model for transport chain choice through Logsum variables. Logsums measures accessibility across an entire multi-modal logistical chain, and are calculated from a logistics model that has been estimated on disaggregated micro data and then used as an input variable in the trade model. Using Logsums in a trade model is new in applied large-scale freight models, where previous models have simply relied on the distance (e.g. crow-fly) between zones. This linkage of accessibility to the trade model makes it possible to evaluate how changes in policies on transport costs and changes in multi-modal networks will influence trade patterns. As an example the paper presents outcomes for a European-wide truck tolling scenario, which showcases to which extent trade is influenced by such a policy. The paper discusses how such a complex model can be estimated and considers the choice of mathematical formulation and the link between the trade model and logistics model. In the outcomes for the tolling scenario we decompose the total effects into effects from the trade model and effects from the logistics model.

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Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Leeds, John Bates Services
Authors: de Jong, G. (Ekstern), Tanner, R. (Ekstern), Rich, J. (Intern), Thorhauge, M. (Intern), Nielsen, O. A. (Intern), Bates, J. (Ekstern)
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Myopic loss aversion in the response of electric vehicle owners to the scheduling and pricing of vehicle charging

Upward expectations of future electric vehicle (EV) growth pose the question about the future load on the electricity grid. While existing literature on EV charging demand management has focused on technical aspects and considered EV-owners as utility maximizers, this study proposes a behavioural model incorporating psychological aspects relevant to EV-owners facing charging decisions and interacting with the supplier. The behavioural model represents utility maximization under myopic loss aversion (MLA) within an ultimatum game (UG) framework where the two players are the EV-owner and the electricity supplier. Experimental economics allowed testing the validity of the behavioural model by designing three experiments where a potential EV-owner faces three decisions (i.e., to postpone EV charging to off-peak periods for a discount proposed by the supplier, the amount of discount to request for off-peak charging at times decided by the supplier, and the amount of discount to accept for supplier-controlled charging) under two contract durations (i.e., short-term, long-term). Findings from the experiments show that indeed potential EV-owners perform charging decisions while being affected by MLA resulting from monetary considerations and the UG participation, and that presenting long-term contracts help potential EV-owners to curtail MLA behaviour and minimise cost even though the assumption of utility maximization is violated. (C) 2016 Elsevier Ltd. All rights reserved.
Ny undersøgelse: aggressionsniveauet er lavere blandt motorcyklister

En ny australsk undersøgelse har set på, om det har betydning for trafikanters aggressionsniveau, hvilket køretøj de benytter. Undersøgelsen viser, at køretøjet påvirker aggressionsniveauet, idet deltagerne var mindre tilbøjelige til at udvise aggression som motorcyklist end som bilist. Undersøgelsen viser endvidere, at der både er ligheder og forskelle med hensyn til, hvilke faktorer der påvirker aggressionsniveauet for de to køretøjstyper.

General information
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Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2017

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Publication: Communication › Newspaper article – Annual report year: 2017

On the boundary between economy and environment in life cycle assessment

Purpose: We investigate how the boundary between product systems and their environment has been delineated in life cycle assessment and question the usefulness and ontological relevance of a strict division between the two. Methods: We consider flows, activities and impacts as general terms applicable to both product systems and their environment and propose that the ontologically relevant boundary is between the flows that are modelled as inputs to other activities (economic or environmental) and the flows that in a specific study are regarded as final impacts, in the sense that no further feedback into the product system is considered before these impacts are applied in decision-making. Using this conceptual model, we contrast the traditional mathematical calculation of the life cycle impacts with a new, simpler computational structure where the life cycle impacts are calculated directly as part of the Leontief inverse, treating product flows and environmental flows in parallel, without the need to consider any boundary between economic and environmental activities. Results and discussion: Our theoretical outline and the numerical example demonstrate that the distinctions and boundaries between product systems and their environment are unnecessary and in some cases obstructive from the perspective of impact assessment, and can therefore be ignored or chosen freely to reflect meaningful distinctions of specific life cycle assessment (LCA) studies. We show that our proposed computational structure is backwards compatible with the current practice of LCA modelling, while allowing inclusion of feedback loops both from the environment to the economy and internally between different impact categories in the impact assessment. Conclusions: Our proposed computational structure for LCA facilitates consistent, explicit and transparent modelling of the feedback loops between environment and the economy and between different environmental mechanisms. The explicit and transparent modelling, combining economic and environmental information in a common computational structure, facilitates data exchange and re-use between different academic fields.

General information
State: Accepted/In press
Organisations: Department of Management Engineering, Quantitative Sustainability Assessment, Transport DTU, Aalborg University, University of Freiburg
On the Circular Supply Chain's Impact on Revenue Growth for Manufacturers of Assembled Industrial Products – a Conceptual Development Approach

Materials scarcity, legislative compliance, and cost savings opportunities drive firms to take back used products from their customers for reuse, recovery, and recycling. For this purpose, firms implement circular supply chains. Although academia has given circular supply chain related topics considerable attention since the 1990s, the relationship between the circular supply chain and the firm’s revenue growth remains under-researched. Using revenue growth theory, this study examines how the use of circular supply chains can grow the revenue of manufacturers of assembled industrial products (e.g. process equipment and engines). Findings show that the circular supply chain can increase revenue streams from the firm’s existing markets, create market opportunities in new geographies, and provide access to market segments unaddressable with the firm’s new products. The paper adds to understanding of the circular supply chain and provides research suggestions into the revenue potential inherent in circular supply chains.

General information
State: Published
Organisations: Center for Bachelor of Engineering Studies, Afdelingen voor Produktionsudvikling, Department of Management Engineering, Operations Management, Management Science, Transport DTU
Authors: Larsen, S. (Intern), Knudby, T. (Intern), van Wonterghem, J. (Intern), Jacobsen, P. (Intern)
Number of pages: 5
Publication date: 2017
Main Research Area: Technical/natural sciences
Circular economy, Circular supply chain, Closed-loop supply chain, Revenue growth, Reverse logistics
DOIs:
10.1109/IEEM.2017.8290235
Source: PublicationPreSubmission
Source-ID: 134656595
Publication: Research - peer-review › Paper – Annual report year: 2017

On the Impact of using Mixed Integer Programming Techniques on Real-world Offshore Wind Parks

Wind power is a leading technology in the transition to sustainable energy. Being a new and still more competitive field, it is of major interest to investigate new techniques to solve the design challenges involved. In this paper, we consider optimization of the inter-array cable routing for offshore wind farms, taking power losses into account. Since energy losses in a cable depend on the load (i.e. wind), cable losses are estimated by considering a possibly large number wind scenarios. In order to deal with different wind scenarios efficiently we used a precomputing strategy. The resulting optimization problem considers two objectives: minimizing immediate costs (CAPEX) and minimizing costs due to power losses. This makes it possible to perform various what-if analyses to evaluate the impact of different preferences to CAPEX versus reduction of power losses. Thanks to the close collaboration with a leading energy company, we have been able to report results on a set of real-world instances, based on six existing wind parks, studying the economical impact of considering power losses in the cable routing design phase.

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Operations Research, Transport DTU
Authors: Fischetti, M. (Intern), Pisinger, D. (Intern)
Pages: 108-118
Publication date: 2017

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Title of host publication: Proceedings of the 6th International Conference on Operations Research and Enterprise Systems (ICORES)
Publisher: SCITEPRESS Digital Library
Main Research Area: Technical/natural sciences
Conference: 6th International Conference on Operations Research and Enterprise System (ICORES 2017), Porto, Portugal, 23/02/2017 - 23/02/2017
Phase-based Planning for Railway Infrastructure Projects

Maintenance for railway infrastructure is expensive and it often connects to a large cost investment. The maintenance work, which is implemented in track possessions, can also cause inconvenience to train operators and passengers. Therefore, Planning for maintenance and track possession is important in terms of economy and rail operations. This study presents two types of Phase-based Decision Support System (PDSS), i.e. Functional Phase-Based Planning Approach (F-PBPA) and Process-Oriented Phase-Based Planning Approach (PO-PBPA). They are used for decision support for the planning of the railway infrastructure maintenance activities at the strategic planning level. The objective is to achieve better economy, as well as improve cost efficiency.

F-PBPA consists of five main phases: Data Collection, Technical Optimization (TeO), Economic Optimization (EcO), Constrained Optimization (CoO), and Evaluation. In this thesis, two railway planning problems are formulated in Mixed Integer Linear Programming: Railway Preventive Condition-Based Tamping Scheduling Problem (RPCBTSP), which is presented in Papers 1-2, and Railway Track Possession Scheduling Problem (RTPSP), which is presented in Paper 3. The proposed models are tested based on the real data collected from two Danish railway corridors. A comparison of the results obtained by using the proposed PDSS with the result obtained from the literature (RPCBTSP) and the current practice (RTPSP), shows a cost reduction for both scheduling problems.

The proposed PDSS (F-PBPA) represents a step forward in solving railway scheduling problems. It can help Infrastructure Managers (IMs) gain a better understanding of the application of optimization in railway planning tasks. There are three optimization phases, TeO, EcO and CoO, that can be performed in sequence. First carries out a technical optimization (EcO), in which the minimal maintenance work can be identified by pure technical conditions. This is followed by an economic optimization (EcO), which results in an economic plan covering the same technically defined maintenance needs while minimizing the costs. Finally, constrained optimization (CoO) includes additional constraints and it allows the railway expert to adjust input parameters, thereby to obtain alternative maintenance plans.

PO-PBPA contains another systematic phase based process. With a focus on Life Cycle Cost (LCC), PO-PBPA can guide IMs, step by step, to estimate the total project cost for railway projects and to identify the solutions that are economically advantageous. Paper 4 suggests a new LCC framework for IMs to consider costs at the strategic planning level, and Paper 5 considers costs at the project planning level. The case studies show that LCC has an influence on the decisions regarding the choice of the track possessions. Similarly, it appears that decisions may change compared to today's practice if other LCC elements are included into the cost estimation, e.g., passenger loss due to delay. A phase-based process such as the proposed PDSS, has great potential to support railway IMs to improve maintenance planning in practice, and reduce the overall costs without affecting railway infrastructure quality.
played by innovation and how it penetrates the new market over time through a diffusion process. However, typical diffusion models in marketing research use fairly simple demand models. In this paper we discuss the problem of predicting market shares for new products and suggest a method that combines advanced choice models with a diffusion model to take into account that new products often need time to gain a significant market share. We have the advantage of a relatively unique databank where respondents were submitted to the same stated choice experiment before and after experiencing an electric vehicle. Results show that typical choice models forecast a demand that is too restrictive in the long period. Accounting for the diffusion effect, instead allows predicting the usual slow penetration of a new product in the initial years after product launch and a faster market share increase after diffusion takes place.

**General information**

State: Published  
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Traffic Modelling, Pontificia Universidad Catolica de Chile  
Authors: Jensen, A. F. (Intern), Cherchi, E. (Intern), Mabit, S. L. (Intern), Ortúzar, J. D. D. (Ekstern)  
Pages: 427-440  
Publication date: 2017  
Main Research Area: Technical/natural sciences

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Web of Science (2018): Indexed yes  
BFI (2017): BFI-level 2  
Web of Science (2017): Indexed Yes  
BFI (2016): BFI-level 2  
Web of Science (2016): Indexed yes  
BFI (2015): BFI-level 2  
Scopus rating (2016): SJR 2.567 SNIP 2.267 CiteScore 3.69  
Web of Science (2016): Indexed yes  
BFI (2014): BFI-level 2  
Scopus rating (2014): SJR 2.995 SNIP 2.286 CiteScore 3.11  
Web of Science (2014): Indexed yes  
BFI (2013): BFI-level 2  
Scopus rating (2013): SJR 2.843 SNIP 3.057 CiteScore 3.34  
ISI indexed (2013): ISI indexed yes  
Web of Science (2013): Indexed yes  
BFI (2012): BFI-level 2  
Scopus rating (2012): SJR 2.75 SNIP 2.408 CiteScore 2.86  
ISI indexed (2012): ISI indexed yes  
BFI (2011): BFI-level 2  
Scopus rating (2011): SJR 2.214 SNIP 2.296 CiteScore 2.4  
ISI indexed (2011): ISI indexed yes  
Web of Science (2011): Indexed yes  
BFI (2010): BFI-level 2  
Scopus rating (2010): SJR 2.533 SNIP 2.433  
Web of Science (2010): Indexed yes  
BFI (2009): BFI-level 2  
Scopus rating (2009): SJR 2.069 SNIP 1.974  
Web of Science (2009): Indexed yes  
BFI (2008): BFI-level 2  
Scopus rating (2008): SJR 3.674 SNIP 3.217  
Scopus rating (2007): SJR 2.77 SNIP 3.343  
Scopus rating (2006): SJR 2.555 SNIP 2.509
Probabilistic Modeling and Visualization for Bankruptcy Prediction

In accounting and finance domains, bankruptcy prediction is of great utility for all of the economic stakeholders. The challenge of accurate assessment of business failure prediction, specially under scenarios of financial crisis, is known to be complicated. Although there have been many successful studies on bankruptcy detection, seldom probabilistic approaches were carried out. In this paper we assume a probabilistic point-of-view by applying Gaussian Processes (GP) in the context of bankruptcy prediction, comparing it against the Support Vector Machines (SVM) and the Logistic Regression (LR). Using real-world bankruptcy data, an in-depth analysis is conducted showing that, in addition to a probabilistic interpretation, the GP can effectively improve the bankruptcy prediction performance with high accuracy when compared to the other approaches. We additionally generate a complete graphical visualization to improve our understanding of the different attained performances, effectively compiling all the conducted experiments in a meaningful way. We complete our study with an entropy-based analysis that highlights the uncertainty handling properties provided by the GP, crucial for prediction tasks under extremely competitive and volatile business environments.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Coimbra
Authors: Antunes, F. (Ekstern), Ribeiro, B. (Ekstern), Pereira, F. C. (Intern)
Pages: 831-843
Publication date: 2017
Main Research Area: Technical/natural sciences

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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 4.29 SJR 1.308 SNIP 2.037
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.511 SNIP 2.29 CiteScore 4
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.696 SNIP 2.816 CiteScore 4.29
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.579 SNIP 2.684 CiteScore 4.06
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
When making investments in railway infrastructure it is important to be able to identify the limits for freight transportation in order to not only use the infrastructure in the best possible way, but to also guide future capacity investments. This paper presents a model to assess the capacity of railway freight transportation on a long term strategic level. The model uses an hourly time discretization and analyses the impact of railway network expansions based on future demand forecasts. It provides an optimal macroscopic freight train schedule and can indicate the time and place of any congestion. In addition, two expansions of the primary model are developed. The first can be used to determine the minimal number of expansions needed to ensure all freight can be feasibly routed, while the second can be used to schedule freight trains at hours not congested by passenger trains using variable penalties for the different passenger busy time slots. As part of a European Union project, all models are applied to a realistic case study that focuses on analyzing the capacity of railway network, in Denmark and Southern Sweden using demand forecasts for 2030. Results suggest that informative solutions can be found quickly with the proposed approach.

The project was partly funded by the EU-project EWTC-II.

General information
State: Accepted/In press
Organisations: Department of Management Engineering, Management Science, Transport DTU, Operations Research, Aalborg University
Authors: Reinhardt, L. B. (Ekstern), Pisinger, D. (Intern), Lusby, R. M. (Intern)
Number of pages: 28
Publication date: 2017
Main Research Area: Technical/natural sciences

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Journal: Flexible Services and Manufacturing Journal
ISSN (Print): 1936-6582
Ratings:
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Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.32 SJR 1.553 SNIP 1.582
Rejsetidsvariabilitet på strækningsniveau


General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, Transport DTU
Authors: Hjorth, K. (Intern), Jensen, T. C. (Intern), Møller, N. F. (Intern), Fosgerau, M. (Intern)
Number of pages: 46
Publication date: 2017

Publication information
Publisher: DTU Management
Original language: English
Main Research Area: Technical/natural sciences
Report Template
To ensure consistent reporting of life cycle assessment (LCA), we provide a report template. The report includes elements of an LCA study as recommended by the ILCD Handbook. Illustrative case study reported according to this template is presented in Chap. 39.

General information
State: Published
Organisations: Department of Management Engineering, Quantitative Sustainability Assessment, Transport DTU
Authors: Bjørn, A. (Intern), Laurent, A. (Intern), Owsianiak, M. (Intern)
Pages: 1051-1058
Publication date: 2017

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Title of host publication: Life Cycle Assessment
Publisher: Springer
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Chapter: 38
Main Research Area: Technical/natural sciences
Business and Management, Sustainability Management, Sustainable Development, Renewable and Green Energy, Manufacturing, Machines, Tools, Operating Procedures, Materials Treatment
DOIs:
10.1007/978-3-319-56475-3_38
Source: FindIt
Source-ID: 2373522939
Publication: Research - peer-review › Book chapter – Annual report year: 2017

Risikofaktorer ved vejarbejde
Uheldsriskoen er forøget på strækninger med vejarbejde. En analyse af dødsuheld i USA viser, at særligt trafikanteres manglende tilpasning af deres adfærd er en vigtig faktor i forbindelse med disse uheld. Tiltag der kan sikre et mere jævnt trafik-flow i passende lav fart på strækninger med vejarbejde er vigtige elementer i forebyggelsen.

General information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2017

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Newspaper: Nyhedsbrevet trafiksikkerhedsforskning
No.: 36
Main Research Area: Technical/natural sciences
Links:
http://www.trafiksikkerhedsforskning.dtu.dk/arkiv/nr-36/risikofaktorer-ved-vejarbejde
Publication: Communication › Newspaper article – Annual report year: 2017

Road Safety Annual Report 2017

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Janstrup, K. H. (Intern)
Number of pages: 586
Publication date: 2017

Publication information
ISBN (Print): 9789282108192
ISBN (Electronic): 9789282108215
Original language: English
Main Research Area: Technical/natural sciences
Road signage comprehension and overload: The role of driving style and need for closure

This study looks at the provision of information via traffic signs and its relation with driving styles, need for closure and socio-economic characteristics of road users. A web-based questionnaire allowed collecting information about traffic signs and road surface markings in 12 traffic locations that were presented in two variations: (i) in the first 6 cases, a first configuration contained information that led to ambiguity about the manoeuvres that were legal and a second configuration added traffic signs to eliminate the ambiguity; (ii) in the second 6 cases, a first configuration presented the road environment without signs and a second configuration added traffic signs to verify information redundancy. Respondents indicated for each location which manoeuvres they deemed legal and how many conflicts they estimated without traffic signs, and safety perception and comfort level improved with the traffic signs. Moreover, respondents reported their socio-economic characteristics and filled two questionnaires about need for closure and driving styles. Completed questionnaires from 753 participants from Hungary with expertise in transport and traffic were analysed via statistical and factor analysis, and results reveal that: (i) road users are heterogeneous in their perception and processing of information, as the number of manoeuvres correctly identified as legal relates to their socio-economic characteristics; (ii) the perception of improvements after the provision of information relates also to the road uses’ socio-economic characteristics and their driving style and need for closure; (iii) different amounts of information are sufficient for different road users not to feel uncertain regarding manoeuvres being legal at a certain traffic location.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Department of Transport, Transport Modelling, Technical University of Denmark
Authors: Bortei-Doku, S. (Ekstern), Kaplan, S. (Intern), Prato, C. G. (Intern), Nielsen, O. A. (Intern)
Pages: 442-449
Publication date: 2017
Conference: 3rd Conference on Sustainable Urban Mobility, Volos, Greece, 26/05/2016 - 26/05/2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Transportation Research Procedia
Volume: 24
ISSN (Print): 2352-1465
Ratings:
Scopus rating (2016): CiteScore 0.82
Original language: English
Need For Closure Scale, Multidimensional Driver Style Inventory, Information, Driver behavior, Traffic signs
Electronic versions:
1_s2.0_S2352146517303460_main.pdf
DOIs:
10.1016/j.trpro.2017.05.065
Source: FindIt
Source-ID: 2371225974
Publication: Research - peer-review › Conference article – Annual report year: 2017

Scheduling EURO-k Conferences
EURO-k conferences are among the largest Operations Research conferences in the world, typically including more than 2000 presentations. As opposed to many other conferences, EURO-k conferences are hierarchically organized, and the conference schedule should reflect this structure to make navigation easier and more logical. In this article we present a scheduling tool that has been developed during the EURO2015 and EURO2016 conferences to schedule the streams, sessions and talks. A schedule is obtained by solving a number of optimization models, each addressing a specific objective. First, areas are assigned to buildings, making sure that related research areas are located close to each other. Next, the goal is to allocate each stream to only one room, and to ensure that the stream consists of a sequence of consecutive time slots. Finally, we optimize the assignment of room sizes. We illustrate the process by showing results from the scheduling of the EURO2016 conference, which took place in Poznan (Poland), July 3–6, 2016.

General information
State: Accepted/In press
Scope Definition
The scope definition is the second phase of an LCA. It determines what product systems are to be assessed and how this assessment should take place. This chapter teaches how to perform a scope definition. First, important terminology and key concepts of LCA are introduced. Then, the nine items making up a scope definition are elaborately explained: (1) Deliverables. (2) Object of assessment, (3) LCI modelling framework and handling of multifunctional processes, (4) System boundaries and completeness requirements, (5) Representativeness of LCI data, (6) Preparing the basis for the impact assessment, (7) Special requirements for system comparisons, (8) Critical review needs and (9) Planning reporting of results. The instructions relate both to the performance and reporting of a scope definition and are largely based on ILCD.

General Information
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Organisations: Department of Management Engineering, Quantitative Sustainability Assessment, Transport DTU
Pages: 75-116
Publication date: 2017

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Publisher: Springer
Chapter: 8
Main Research Area: Technical/natural sciences
Business and Management, Sustainability Management, Sustainable Development, Renewable and Green Energy, Manufacturing, Machines, Tools, Operating Procedures, Materials Treatment
DOIs: 10.1007/978-3-319-56475-3_8
Source: FindIt
Source-ID: 2373522934
Publication: Research - peer-review › Book chapter – Annual report year: 2017

Simulatortrænet fodgængertræning af ældre
At finde et sikkerst tidspunkt at krydse en trafikeret vej med blandet trafik og varierende kørehastigheder kan være vanskeligt, ikke mindst for ældre. En ny undersøgelse fra Frankrig tyder på, at træning i en fodgængersimulator kan bidrage til, at ældre fodgængers risikobevidsthed øges, så de bliver bedre i stand til at vælge sikre tidspunkter at krydse en vej på og risikoen for påkørsel reduceres.

General Information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2017

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Newspaper: Nyhedsbrevet trafiksikkerhedsforskning
No.: 37
Main Research Area: Technical/natural sciences
Publication: Communication › Newspaper article – Annual report year: 2017
Solving the pre-marshalling problem to optimality with A* and IDA*

We present a novel solution approach to the container pre-marshalling problem using the A* and IDA* algorithms combined with several novel branching and symmetry breaking rules that significantly increases the number of pre-marshalling instances that can be solved to optimality. A* and IDA* are graph search algorithms that use heuristics combined with a complete graph search to find optimal solutions to problems. The container pre-marshalling problem is a key problem for container terminals seeking to reduce delays of inter-modal container transports. The goal of the container pre-marshalling problem is to find the minimal sequence of container movements to shuffle containers in a set of stacks such that the resulting stacks are arranged according to the time each container must leave the stacks. We evaluate our approach on three well-known datasets of pre-marshalling problem instances, solving over 500 previously unsolved instances to optimality, which is nearly twice as many instances as the current state-of-the-art method solves.

**General information**
State: Published
Organisations: Department of Management Engineering, Management Science, Operations Research, Transport DTU, University of Paderborn, University of Hamburg
Authors: Tierney, K. (Ekstern), Pacino, D. (Intern), Voß, S. (Ekstern)
Pages: 223-259
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Main Research Area: Technical/natural sciences

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Journal: Flexible Services and Manufacturing Journal
Volume: 29
Issue number: 2
ISSN (Print): 1936-6582
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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.32 SJR 1.553 SNIP 1.582
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.211 SNIP 1.375 CiteScore 2.21
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.058 SNIP 1.797 CiteScore 1.68
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.252 SNIP 1.656 CiteScore 1.48
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.819 SNIP 0.52 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.537 SNIP 0.683 CiteScore 0.5
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.425 SNIP 0.8
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.301 SNIP 1.008
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.613 SNIP 0.751
Scopus rating (2007): SJR 0.514 SNIP 1.714
Scopus rating (2006): SJR 0.585 SNIP 1.599
Scopus rating (2005): SJR 0.301 SNIP 0.707
Scopus rating (2004): SJR 0.473 SNIP 0.772
Strategic assessment of capacity consumption in railway networks: Framework and model

In this paper, we develop a new framework for strategic planning purposes to calculate railway infrastructure occupation and capacity consumption in networks, independent of a timetable. Furthermore, a model implementing the framework is presented. In this model different train sequences are generated and assessed to obtain timetable independence. A stochastic simulation of delays is used to obtain the capacity consumption. The model is tested on a case network where four different infrastructure scenarios are considered. Both infrastructure occupation and capacity consumption results are obtained efficiently with little input. The case illustrates the model's ability to quantify the capacity gain from infrastructure scenario to infrastructure scenario which can be used to increase the number of trains or improve the robustness of the system.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Rambøll Danmark A/S, Erasmus University Rotterdam
Authors: Jensen, L. W. (Intern), Landex, A. (Intern), Nielsen, O. A. (Intern), Kroon, L. G. (Ekstern), Schmidt, M. (Ekstern)
Pages: 126-149
Publication date: 2017
Main Research Area: Technical/natural sciences

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Journal: Transportation Research. Part C: Emerging Technologies
Volume: 74
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BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.43 SJR 1.935 SNIP 2.531
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.941 SNIP 2.678 CiteScore 4.23
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.046 SNIP 3.228 CiteScore 3.84
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.847 SNIP 3.673 CiteScore 4.01
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.585 SNIP 2.782 CiteScore 2.76
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
This review of the literature collects innovative market mechanisms that tend to get overlooked in the discussion of whether unassisted energy-only markets can ensure sufficient capacity or if capacity remuneration mechanisms are required.
The paper complements existing literature reviews and pinpoints advantageous research areas relating to the market design of electricity systems with high shares of variable renewable energy.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, Transport DTU
Authors: Sekamane, J. K. (Intern), Katz, J. (Intern), Skytte, K. (Intern), Morthorst, P. E. (Intern)
Number of pages: 4
Publication date: 2017

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Main Research Area: Technical/natural sciences
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Projects:
Source: PublicationPreSubmission
Source-ID: 134030760
Publication: Research - peer-review › Conference abstract in proceedings – Annual report year: 2017

Suitability of commercial transport for a shift to electric mobility with Denmark and Germany as use cases
This paper identifies commercial sectors suitable for a shift to electric mobility in Denmark and Germany by analysing daily driving distance. The paper concludes that construction, human health and other service sectors are the most suitable sectors for electric mobility because many vehicles are registered in these sectors and daily mileage is reasonably low. They should be primary target groups of specific policy measures to promote the use of electric vehicles. Both Denmark and Germany have incentives to promote the use of electric vehicles. Nevertheless, electric vehicles do generally not
show economic benefits unless travel distance is high. However, today the travel range of large vans is an important barrier for electrification due to battery weight and the limitation of 3.5 tonnes gross vehicle weight for driving with a normal driving licence. The rule needs amendments for electric vehicles, as has been done in Germany. The paper recommends EU countries follow the German rule allowing EVs up to 4.25 tonnes to be driven with a class B licence, thereby potentially creating a market for big vans with long travel range.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, German Aerospace Center, COWI AS
Authors: Christensen, L. (Intern), Klauenberg, J. (Ekstern), Kveiborg, O. (Ekstern), Rudolph, C. (Ekstern)
Number of pages: 13
Publication date: 2017
Main Research Area: Technical/natural sciences

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Journal: Research in Transportation Economics
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BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.42 SJR 0.789 SNIP 1.177
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.652 SNIP 0.83 CiteScore 1.13
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.874 SNIP 1.365 CiteScore 1.23
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.069 SNIP 1.482 CiteScore 1.37
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.652 SNIP 0.899 CiteScore 0.89
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.38 SNIP 0.557 CiteScore 0.61
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.265 SNIP 0.989
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.234 SNIP 0.14
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.137 SNIP 0.066
Scopus rating (2007): SJR 0.164 SNIP 0.009
Scopus rating (2006): SJR 0.174 SNIP 0
Scopus rating (2005): SJR 0.153
Scopus rating (2004): SJR 0.104 SNIP 0
Scopus rating (2003): SJR 0.116 SNIP 0.667
Scopus rating (2002): SJR 0.114 SNIP 0.092
Scopus rating (2001): SJR 0.172 SNIP 0.266
Scopus rating (2000): SJR 0.135 SNIP 1.38
Scopus rating (1999): SJR 0.528 SNIP 0.241
Original language: English
Transportation, Economics, Econometrics and Finance (miscellaneous), Article history, Commercial transport, Driving licence regulation, Electric mobility, Light duty vehicles, Urban freight
DOIs:
10.1016/j.retrec.2017.08.004
Synlig aktivitet ved vejarbejde sænker fart

I en ny norsk undersøgelse har man set på, om synlig aktivitet i forbindelse med vejarbejde har betydning for bilisters foretrukne kørehastighed. Analysen viste, at bilister foretrækker en lavere kørehastighed, når der er synlig aktivitet og når de oplever, at der er en god grund til at sænke fart. Dette er vigtigt at tænke ind i forebyggende tiltag, der skal bidrage til en sikker kørehastighed blandt bilister.

General information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2017

Testing the slope model of scheduling preferences on stated preference data

The valuation of travel time variability is derived either from a structural model, given information on departure time, or directly from a reduced-form model where departure time is assumed to be optimally chosen. The two models are theoretically equivalent under certain assumptions, hence are expected to yield similar results. We use stated preference data to compare the valuation of travel time variability under a structural model where trip-timing preferences are defined in terms of time-dependent utility rates, the “slope model”, against its reduced-form model. Two choice experiments are used that are identical except one has a fixed departure time while the other allows respondents to choose departure time freely. The empirical results in this paper do not support the theoretical equivalence of the two models as the implied value of travel time variability under the reduced-form model is an order of magnitude larger. This finding, which is robust to various specification tests, is in line with a recent Swedish study by Börjesson, Eliasson and Franklin [Transportation Research Part B: Methodological, 46(7), 855–873 (2012)]. Since our data allows a direct comparison of the two approaches, we are able to rule out some potential explanations lined up by past research for the observed discrepancy between the two models.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, Transport DTU, Transport Modelling
Authors: Abegaz, D. F. (Intern), Hjorth, K. (Intern), Rich, J. (Intern)
Pages: 409-436
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Transportation Research. Part B: Methodological
Volume: 104
ISSN (Print): 0191-2615
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.57 SJR 2.742 SNIP 2.433
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 3.027 SNIP 2.85 CiteScore 5.15
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
The Fear of Pain Questionnaire-III and the Fear of Pain Questionnaire-Short Form: a confirmatory factor analysis

Background: The Fear of Pain Questionnaire-III (FPQ-III) is a widely used instrument to assess the fear of pain (FOP) in clinical and nonclinical samples. The FPQ-III has 30 items and is divided into three subscales: Severe Pain, Minor Pain and Medical Pain. Due to findings of poor fit of the original three-factor FPQ-III model, the Fear of Pain Questionnaire-Short Form (FPQ-SF) four-factor model has been suggested as an alternative. The FPQ-SF is a revised version of the FPQ-III, reduced to 20 items and subdivided into four subscales: Severe Pain, Minor Pain, Injection Pain and Dental Pain.

Aims and methods: The purpose of the study was to investigate the model fit, reliability and validity of the FPQ-III and the FPQ-SF in a Norwegian nonclinical sample, using confirmatory factor analysis (CFA). The second aim was to explore the model fit of the two scales in male and female subgroups separately, since previous studies have uncovered differences in how well the questionnaires measure FOP across sex; thus, the questionnaires might not be sex neutral. It has been argued that the FPQ-SF model is better because of the higher fit to the data across sex. To explore model fit across sex within the questionnaires, the model fit, validity and reliability were compared across sex using CFA.

Results: The results revealed that both models' original factor structures had poor fit. However, the FPQ-SF had a better fit overall, compared to the FPQ-III. The model fit of the two models differed across sex, with better fit for males on the FPQ-III and for females on the FPQ-SF.

Conclusion: The FPQ-SF is a better questionnaire than the FPQ-III for measurement of FOP in Norwegian samples and across sex subgroups. However, the FPQ-III is a better questionnaire for males than for females, whereas the FPQ-SF is a better questionnaire for females than for males. The findings are discussed and directions for future investigations outlined.
This paper investigates the development of house prices in Copenhagen in the period 1994-2013, while paying special attention to the heterogeneous impact of the boom and bust periods along the dimensions of housing type (single vs multifamily housing), geography and quality. To allow for price developments that can differ by quality, we use a recently developed generalization of the conventional Muth model that assumes a constant unit price across the quality spectrum. It allows us to separately consider the development of house prices and quality in Copenhagen neighbourhoods. Moreover, we investigate the validity of the common assumption of a constant unit price and reject it decisively. We use detailed housing transaction data for the greater Copenhagen area. We show that the housing boom of the 2000’s and the bust that followed hit the lowest quality segments significantly harder than the high quality segments of the housing market.
The forming of truck platoons: How to make it work

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Rasmussen, T. K. (Intern), Rich, J. (Ekstern), Nielsen, O. A. (Intern), Pedersen, T. R. (Intern)
Publication date: 2017

Host publication information
Title of host publication: Proceedings of the 6th Symposium of the European Association for Research in Transportation
Main Research Area: Technical/natural sciences
Conference: The VI European Association for Research in Transportation (hEART) Symposium, Haifa, Israel, 12/09/2017 - 12/09/2017
Publication: Research - peer-review › Article in proceedings – Annual report year: 2017

The implications of the new sulphur limits on the European Ro-Ro sector
In an effort to reduce the environmental impacts of maritime transportation, the International Maritime Organization (IMO) designated special Sulphur Emission Control Areas (SECAs) where ships are required to use low-sulphur fuel. In January 2015, the sulphur limit within SECAs was lowered to 0.1%, which can only be achieved if vessels are using pricier ultra-low sulphur fuel, or invest in abatement technologies. The increased operating costs borne by Ro-Ro operators in SECAs due to the stricter limits can result in the shutting down of some routes and a redistribution of cargo flows with land-based alternatives. The exact repercussions of the new sulphur limits are difficult to identify in the wake of significant recent reductions of the fuel prices for both low-sulphur and heavy fuel oil. This paper presents a modal split model that estimates modal shifts vis-à-vis competing maritime and land-based modes available to shippers. This allows examining the implications of the recent low prices to modal choice, and the influence a potential increase in fuel prices may have. The model is applied to seven routes affected by the regulation based on data from a leading European Ro-Ro operator. Sensitivity analyses on market share data, cargo values, freight rates, and haulers rates are conducted. Emissions inventories are constructed to assess the environmental efficacy of the SECA regulation. The novelty of the proposed model lies in the examination of the ex-post implications of shutting down a service and the redistribution of transport. Recommendations to mitigate and reverse the negative side-effects of such environmental legislation are proposed.

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Operations Management, Transport DTU
Authors: Zis, T. (Intern), Psaraftis, H. N. (Intern)
Pages: 185-201
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication information
Journal: Transportation Research. Part D: Transport & Environment
Volume: 52
ISSN (Print): 1361-9209
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.08 SJR 1.195 SNIP 1.573
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.143 SNIP 1.379 CiteScore 2.65
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.427 SNIP 1.953 CiteScore 2.49
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.213 SNIP 1.663 CiteScore 2.08
We consider a strategic infrastructure and tanker fleet sizing problem in the liquefied natural gas business. The goal is to minimize long-term on-shore infrastructure and tanker investment cost combined with interrelated expected cost for operating the tanker fleet. A non-linear arc-based model and an exact solution method based on a set-partitioning formulation are developed. The latter approach allows very fast solution times. Computational results for a case study with a liner shipping company are presented, including an extensive sensitivity analysis to account for limited predictability of key parameter values, to analyze the solutions’ robustness and to derive basic decision rules.

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Operations Research, Transport DTU, L’Oréal Danmark A/S
Authors: Koza, D. F. (Intern), Røpke, S. (Intern), Molas, A. B. (Ekstern)
Pages: 96-114
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Transportation Research. Part E: Logistics and Transportation Review
Volume: 99
ISSN (Print): 1366-5545
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
The multi-port berth allocation problem with speed optimization and emission considerations
The container shipping industry faces many interrelated challenges and opportunities, as its role in the global trading system has become increasingly important over the last decades. On the one side, collaboration between port terminals and shipping liners can lead to costs savings and help achieve a sustainable supply chain, and on the other side, the optimization of operations and sailing times leads to reductions in bunker consumption and, thus, to fuel cost and air emissions reductions. To that effect, there is an increasing need to address the integration opportunities and environmental issues related to container shipping through optimization. This paper focuses on the well known Berth Allocation Problem (BAP), an optimization problem assigning berthing times and positions to vessels in container terminals. We introduce a novel mathematical formulation that extends the classical BAP to cover multiple ports in a shipping network under the assumption of strong cooperation between shipping lines and terminals. Speed is optimized on all sailing legs between ports, demonstrating the effect of speed optimization in reducing the total time of the operation, as well as total fuel consumption and emissions. Furthermore, the model implementation shows that an accurate speed discretization can result in far better economic and environmental results.
The Recharging Infrastructure Needs for Long Distance Travel by Electric Vehicles: A Comparison of Battery-Switching and Quick-Charging Stations

On-road electric vehicle recharging infrastructure is essential in the transformation of electric vehicles into a practical transportation option. This study focuses upon assessing the need for recharging infrastructure for long distance travel for a large market share of electric vehicles, finding the optimal infrastructure deployment, and understanding the economic, social and environmental costs and benefits associated with the optimal infrastructure deployment. The analysis considers quick-charging and battery-switching as plausible recharging technologies. Results show: (i) the promotion of electric vehicles is beneficial when considering economic costs and benefits for operators and users, tax redistribution, and environmental externalities, even with a relatively modest market share; (ii) the number of required recharging stations for satisfaction of the travel demand is at the magnitude of 1–2% of the current gasoline infrastructure, under the assumption of wide availability of off-road recharging at home and the workplace; (iii) the optimal deployment of the recharging
stations is along the main national highways outside of urban conurbations, under the assumption of wide availability of home recharging; (iv) the battery-switching technology is far more attractive to the consumer than the quick-charging technology for long-distance travel requiring more than one recharging visit.

General information
State: Published
Organisations: Office for Finance and Accounting, Transport Modelling, Department of Management Engineering, Transport DTU, Management Science, Operations Research, Systems Analysis
Authors: Christensen, L. (Intern), Jensen, T. C. (Intern), Kaplan, S. (Intern), Røpke, S. (Intern), Olsen, A. (Intern)
Number of pages: 21
Pages: 341-361
Publication date: 2017

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Title of host publication: Spatial Analysis and Location Modeling in Urban and Regional Systems
Editor: Thill, J.
ISBN (Print): 978-3-642-37895-9
ISBN (Electronic): 978-3-642-37896-6
Series: Advances in Geographic Information Science
Main Research Area: Technical/natural sciences
Geography, Geographical Information Systems/Cartography, Electric vehicles, Recharging stations, Location optimization, Socio-economic analysis, Battery-switching, Quick-charging, Spatial-optimization, EVs

The restricted stochastic user equilibrium with threshold model: Large-scale application and parameter testing
This paper presents the application and calibration of the recently proposed Restricted Stochastic User Equilibrium with Threshold model (RSUET) to a large-scale case-study. The RSUET model avoids the limitations of the well-known Stochastic User Equilibrium model (SUE) and the Deterministic User Equilibrium model (DUE), by combining the strengths of the Boundedly Rational User Equilibrium model and the Restricted Stochastic User Equilibrium model (RSUE). Thereby, the RSUET model reaches an equilibrated solution in which the flow is distributed according to Random Utility Theory among a consistently equilibrated set of paths which all are within a threshold relative to the cost on the cheapest path and which do not leave any attractive paths unused. Several variants of a generic RSUET solution algorithm are tested and calibrated on a large-scale case network with 18,708 arcs and about 20 million OD-pairs, and comparisons are performed with respect to a previously proposed RSUE model as well as an existing link-based mixed Multinomial Probit (MNP) SUE model. The results show that the RSUET has very attractive computation times for large-scale applications and demonstrate that the threshold addition to the RSUE model improves the behavioural realism, especially for high congestion cases. Also, fast and well-behaved convergence to equilibrated solutions among non-universal choice sets is observed across different congestion levels, choice model scale parameters, and algorithm step sizes. Clearly, the results highlight that the RSUET outperforms the MNP SUE in terms of convergence, calculation time and behavioural realism. The choice set composition is validated by using 16,618 observed route choices collected by GPS devices in the same network and observing their reproduction within the equilibrated choice sets generated by the RSUET model. Relevantly, the RSUET model is very successful in reproducing observed link.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Leeds, University of Queensland
Authors: Rasmussen, T. K. (Intern), Nielsen, O. A. (Intern), Watling, D. P. (Ekstern), Prato, C. G. (Ekstern)
Pages: 1-24
Publication date: 2017
Main Research Area: Technical/natural sciences
The role of information systems in non-routine transit use of university students: Evidence from Brazil and Denmark

In this study we seek to understand the relation between travel information, transit use intentions and night travel. We hypothesize that transit use is related to the perceived usefulness and the ease-of-use of the system, which are related to information quality and real-time information availability. The hypothesized relations are anchored theoretically in the Technology Acceptance Model and validated empirically in two case-studies: (i) Copenhagen (Denmark), characterized by a highly integrated transit system with an advanced web-based information system; (ii) Recife and Natal (Brazil), characterized by a lower perceived level-of-service and non-integrated information sources. Data from a tailor-made survey of 1123 university students were collected. Structural equation models were employed for explaining the use of transit as a function of the observed respondent characteristics and the latent constructs. The results show that: (i) information search quality and source explain transit use; (ii) information quality underlies level-of-service and familiarity; (iii) the use of real-time information links to information quality and familiarity; (iv) general transit use and non-routine use during night and to unfamiliar places are correlated; and (v) the behavioral framework is confirmed with the two case-studies. (C) 2016 Elsevier Ltd. All rights reserved.
The use of electric vehicles: A case study on adding an electric car to a household

The market share of battery electric vehicles (EVs) is expected to increase in the near future, but so far little is known about the actual usage of this emergent technology. Consumer preference studies have indicated that the current limitation on driving distance is important. At the same time studies on the actual use of household vehicles indicate modest requirements for daily travel. An unresolved issue is to what extent these range limitations affect daily travel in EVs. In this study, we use real electric vehicle trip data to study the distribution of daily use and types of home-based
journeys where a household decides to use an electric vehicle instead of their conventional vehicle. The results show how several factors related to distance and number of necessary charging events have plausible effects on electric vehicle travel behaviour. Further, the modelling indicates that the EV alternative is mostly used for well-planned transport and that EV use will not be the same as use of the conventional vehicle in two-vehicle households.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Technical University of Denmark
Authors: Jensen, A. F. (Intern), Mabit, S. L. (Ekstern)
Number of pages: 11
Pages: 89-99
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Transportation Research. Part A: Policy & Practice
Volume: 106
ISSN (Print): 0965-8564
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.26 SJR 1.613 SNIP 1.944
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.781 SNIP 1.906 CiteScore 3.02
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.25 SNIP 2.597 CiteScore 3.49
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.355 SNIP 2.824 CiteScore 3.46
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.42 SNIP 2.652 CiteScore 3
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.87 SNIP 2.538 CiteScore 2.61
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.648 SNIP 2.202
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.225 SNIP 2.136
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.325 SNIP 2.435
Scopus rating (2007): SJR 1.573 SNIP 2.165
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.39 SNIP 2.895
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.869 SNIP 1.716
Scopus rating (2004): SJR 1.915 SNIP 2.545
Scopus rating (2003): SJR 1.473 SNIP 2.014
Threshold-based Stochastic User Equilibrium models

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, University of Leeds
Authors: Watling, D. P. (Ekstern), Rasmussen, T. K. (Intern), Nielsen, O. A. (Intern), Prato, C. G. (Ekstern)
Publication date: 2017
Event: Abstract from INFORMS Transportation and Logistics Society 2017, Chicago, United States.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Conference abstract for conference – Annual report year: 2017

Tilpasser ældre deres kørsel, når de har kognitive svækkelser?
At køre bil er en krævende opgave, og kognitive svækkelser kan derfor gøre det vanskeligt at køre trafiksikkert. En ny australisk undersøgelse tyder på, at ældre i nogen grad kompenserer for aldersrelaterede kognitive svækkelser uden selv at være opmærksom på, at de gør det. Undersøgelsen viser endvidere, at personer, der regelmæssigt kører med de ældre som passagerer, kan bidrage med vigtig information om, hvilke udfordringer de ældre bilister har, og hvordan de håndterer dem.

General information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2017

Publication information
Newspaper: Nyhedsbrevet trafiksikkerhedsforskning
No.: 37
Main Research Area: Technical/natural sciences
Links: http://www.trafiksikkerhedsforskning.dtu.dk/Arkiv/Nr-37/Selvregulering-blandt-aeldre
Publication: Communication › Newspaper article – Annual report year: 2017

Time constrained liner shipping network design
We present a mathematical model and a solution method for the liner shipping network design problem. The model takes into account coordination between vessels and transit time restrictions on the cargo flow. The solution method is an improvement heuristic, where an integer program is solved iteratively to perform moves in a large neighborhood search. Our improvement heuristic is applicable as a real-time decision support tool for a liner shipping company. It can be used to find improvements to the network when evaluating changes in operating conditions or testing different scenarios. Computational results on the benchmark suite LINER-LIB are reported. (C) 2016 Elsevier Ltd. All rights reserved.

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Transport DTU, Operations Research, Ecole Polytechnique de Montreal
Authors: Karsten, C. V. (Intern), Brouer, B. D. (Intern), Desaulniers, G. (Ekstern), Pisinger, D. (Intern)
Pages: 152-162
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication information
Tramp ship routing and scheduling with voyage separation requirements

In this paper we explore tramp ship routing and scheduling. Tramp ships operate much like taxis following the available demand. Tramp operators can determine some of their demand in advance by entering into long-term contracts and then try to maximise profits from optional voyages found in the spot market. Routing and scheduling a tramp fleet to best utilise fleet capacity according to current demand is therefore an ongoing and complicated problem. Here we add further complexity to the routing and scheduling problem by incorporating voyage separation requirements that enforce a minimum time spread between some voyages. The incorporation of these separation requirements helps balance the conflicting objectives of maximising profit for the tramp operator and minimising inventory costs for the charterer, since these costs increase if similar voyages are not performed with some separation in time. We have developed a new and exact branch-and-price procedure for this problem. We use a dynamic programming algorithm to generate columns and describe a time window branching scheme used to enforce the voyage separation requirements which we relax in the master problem. Computational results show that our algorithm in general finds optimal solutions very quickly and performs much faster compared to an earlier a priori path generation method. Finally, we compare our method to an earlier adaptive large neighbourhood search heuristic and find that on similar-sized instances our approach generally uses less time to find the optimal solution than the adaptive large neighbourhood search method uses to find a heuristic solution.
Transformation of India's transport sector under Global Warming of 2°C and 1.5°C Scenario

The Paris agreement stresses concerted efforts to limit global temperature increase to 2°C and make efforts towards achieving 1.5°C temperature stabilization. Countries announced actions under the Nationally Determined Contributions outlining domestic mitigation actions to achieve the global target. Understanding the impact of these actions on achieving these ambitions requires an assessment of long-term national level scenarios. Limited studies currently exist that model long term scenarios at national level addressing the impacts of Nationally Determined Contributions and the additional actions required, especially at the sectoral level. The paper compares four alternate future scenarios for India spanning till 2050, with a specific focus on the passenger and freight transportation. The analysis is performed using the ANSWER MARKAL model and complemented with methodologies to estimate transportation demand under strong decarbonisation pathways. The results show that 1.5°C scenario would need immediate actions and deep transformations. Demand side actions would, in addition to infrastructure investments require transforming human behaviour through use of information technology, internet and sharing economy. Clean vehicle technologies need to play a much bigger role and fossil fuel dependence would be moderated with the dominance of electricity, hydrogen and biofuels. The higher share of electricity in transport is complimented with accelerated decarbonisation of electricity. This transformation required for 1.5°C scenario calls for innovations that would be driven through national and sectoral policies and explicit carbon prices.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, UNEP DTU Partnership, Indian Institute of Management Ahmedabad
Authors: Dhar, S. (Intern), Pathak, M. (Ekstern), Shukla, P. (Ekstern)
Pages: 417-427
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Cleaner Production
Volume: 172
ISSN (Print): 0959-6526
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.83 SJR 1.615 SNIP 2.382
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.609 SNIP 2.383 CiteScore 5.57
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.661 SNIP 2.477 CiteScore 4.6
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.644 SNIP 2.581 CiteScore 4.47
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.706 SNIP 2.328 CiteScore 4.07
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
Uncertainty Management and Sensitivity Analysis

Uncertainty is always there and LCA is no exception to that. The presence of uncertainties of different types and from numerous sources in LCA results is a fact, but managing them allows to quantify and improve the precision of a study and the robustness of its conclusions. LCA practice sometimes suffers from an imbalanced perception of uncertainties, justifying modelling choices and omissions. Identifying prevalent misconceptions around uncertainties in LCA is a central goal of this chapter, aiming to establish a positive approach focusing on the advantages of uncertainty management. The main objectives of this chapter are to learn how to deal with uncertainty in the context of LCA, how to quantify it, interpret and use it, and how to communicate it. The subject is approached more holistically than just focusing on relevant statistical methods or purely mathematical aspects. This chapter is neither a precise statistical method description, nor a philosophical essay about the concepts of uncertainty, knowledge and truth, although you will find a little bit of both. This
chapter contains (1) an introduction of the essential terminology and concepts of relevance for LCA; (2) a discussion of main sources of uncertainty and how to quantify them; (3) a presentation of approaches to calculate uncertainty for the final results (propagation); (4) a discussion of how to use uncertainty information and how to take it into account in the interpretation of the results; and finally (5) a discussion of how to manage, communicate and present uncertainty information together with the LCA results.

**General information**

State: Published  
Organisations: Department of Management Engineering, Department of Applied Mathematics and Computer Science, Statistics and Data Analysis, Transport DTU, Quantitative Sustainability Assessment, Irstea  
Authors: Rosenbaum, R. K. (ed.) (Ekstern), Georgiadis, S. (Intern), Fantke, P. (Intern)  
Pages: 271-321  
Publication date: 2017

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Publisher: Springer  
ISBN (Print): 978-3-319-56474-6  
Chapter: 11

Series: Life Cycle Assessment  
Main Research Area: Technical/natural sciences

**Use of Taxi-Trip Data In Analysis of Demand Patterns for Detection and Explanation of Anomalies**

Because of environmental and economic stress, current strong investment in adaptive transport systems can efficiently use capacity, minimizing costs and environmental impacts. The common vision is of a system that dynamically changes itself (the supply) to anticipate the needs of travelers (the demand). In some occasions, unexpected and unwanted demand patterns are noticed in the traffic network; these patterns lead to system failures and cost implications. Significantly, low speeds or excessively low flows at an unforeseeable time are only some of the phenomena that are often noticed and need to be explained for a transport system to develop a better future response. The objective of this research was the formulation of a methodology that could identify anomalies on traffic networks and correlate them with special events by using Internet data. The main subject of interest in this study was the investigation of why traffic congestion was occurring as well as why demand fluctuated on days when there were no apparent reasons for such phenomena. The system was evaluated by using Google’s public data set for taxi trips in New York City. A “normality” baseline was defined at the outset and then used in the subsequent study of the demand patterns of individual days to detect outliers. With the use of this approach it was possible to detect fluctuations in demand and to analyze and correlate them with disruptive event scenarios such as extreme weather conditions, public holidays, religious festivities, and parades. Kernel density analysis was used so that the affected areas, as well as the significance of the observed differences compared with the average day, could be depicted.

**General information**

State: Published  
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling  
Authors: Markou, I. (Intern), Rodrigues, F. (Intern), Pereira, F. C. (Intern)  
Pages: 129-138  
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Main Research Area: Technical/natural sciences

**Publication information**

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Web of Science (2018): Indexed yes  
BFI (2017): BFI-level 1  
Web of Science (2017): Indexed Yes
Viewpoint: Expand your career horizons with a position abroad

It's job market season again. Are you sticking your toe in the water? Looking for a new challenge? A change of weather? Why not make a big splash and consider a position beyond your country's borders? Of course, for decades institutions in English-speaking nations have filled their ranks with recruits from around the world, but rarely does an academic from an English-speaking nation make the move abroad.
Accounting for the Theory of Planned Behaviour in departure time choice
Motivating people to change their departure time could play a key role in reducing peakhour congestion, which remains one of the most prevalent transport problems in large urban areas. To achieve this behavioural change, it is necessary to better understand the factors that influence departure time choice. So far departure time choice modelling focussed mainly on objective factors, such as time and costs as main behavioural determinants. In this study, we derived psychological factors based on the Theory of Planned Behaviour, estimated them based on structural equation modelling, and included them into a discrete choice model. The psychological factors were measured based on an online questionnaire addressed to car commuters to the city centre of Copenhagen (N = 286). The questionnaire additionally included a travel diary and a stated preference experiment with nine departure time choice scenarios. All psychological factors had a significant effect on departure time choice and could improve the model as compared to a basic discrete choice model without latent constructs. As expected, the effects of the psychological factors were different depending on framework conditions: for people with fixed starting times at work, the intention to arrive at work on time (as estimated by subjective norm, attitude, perceived behavioural control) had the strongest effect; for people with flexible working hours, the attitude towards short travel time was most relevant. Limitations, the inclusion of additional psychological factors and their possible interactions are discussed.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Thorhauge, M. (Intern), Haustein, S. (Intern), Cherchi, E. (Intern)
Pages: 94–105
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication Information
Journal: Transportation Research. Part F: Traffic Psychology and Behaviour
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BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.36 SJR 1.065 SNIP 1.392
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.023 SNIP 1.454 CiteScore 2.06
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.986 SNIP 1.601 CiteScore 2.02
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.988 SNIP 1.765 CiteScore 2.22
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.62 SNIP 2.441 CiteScore 2.54
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.28 SNIP 2.175 CiteScore 2.56
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.184 SNIP 1.651
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.359 SNIP 1.824
Web of Science (2009): Indexed yes
Airbags til cyklister

En cykelhjelms størrelse og tykkelse er afgørende for dens evne til at dæmpe det stød som cyklister udsættes for i forbindelse med styrt og/eller kollision. Både praktisk og æstetisk er der dog grænser for, hvor stor en hjelm cyklister vil cykle rundt med. En gruppe amerikanske forskere har testet en ny type cykelhjelm, der udvider sig i forbindelse med styrt/kollision. Forskerne konkluderer, at den nye hjelmtip e har potentielle til god beskyttelse mod hovedskader, men at der er behov for omfattende forskningsindsats før der kan konkluderes endeligt vedrørende den trafiksikkerhedsærlige effekt.

General information
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Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
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Volume: 34
Original language: Danish
Publication: Communication › Journal article – Annual report year: 2016

A Matheuristic for the Cargo Mix Problem

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Transport DTU
Authors: Christensen, J. M. (Intern), Pacino, D. (Intern)
Publication date: 2016
Event: Paper presented at 9th Triennial Symposium on Transportation Analysis, Oranjestad, Aruba.
Main Research Area: Technical/natural sciences
Source: PublicationPreSubmission
Source-ID: 128148264
Publication: Research - peer-review › Paper – Annual report year: 2016
A Simple Synchro – Modal Decision Support Tool for the Piraeus Container Terminal

The concept of Synchro modality is effectively an evolution of a multimodal supply chain. It integrates different transport modes and gives shippers and logistics service providers the freedom to deploy different modes of transportation in the same chain and in a flexible way so as to gain the desired outcome according to their priorities in a certain trip. Time, costs and emissions are certainly the three most relevant parameters when talking about a multimodal transportation chain. In most cases the logistics provider has set priorities to conform with, and obviously above mentioned constrains influence each other in an adverse way. With the development of ICT technologies and systems installed on board and on shore and with a simple decision support system fed with input from tracking and tracing systems or traffic monitoring systems, one can easily and flexibly plan his transportation job and maintain his set priority while in parallel keeping the remaining two parameters in control. Down times for example could be eliminated and efficiency gains could be achieved with decreased environmental footprint. The Port of Piraeus is the largest Greek seaport and one of the largest ports in the Mediterranean Sea basin. It exhibits an impressive container traffic growth rate over the last 4 years triggered by its partial privatization and a recently completed hinterland connection to the rail network, which associated the port with the South-Eastern European corridor e.g. the route Far Eastern ports – Piraeus – Prague. The current paper will present an easy to use simple tool to continuously assess even during the transportation event all the alternative modes for a given destination in terms of time cost and emissions. An analytical fully parameterized model will be the basis for this tool which will be run for the chain Shanghai - Piraeus – Prague. The overall scenario is as follows: A container ship is arriving from China to the Piraeus Container Terminal. One of its containers is destined to an inland Enterprise in Prague. The most common way for transportation to Prague is rail, but also truck could be an alternative solution and of course a combination of a Short Sea Shipping part to Thessaloniki and then truck or train to Prague. Emphasis in the calculations will be given to emissions for all the modes and relations will be shown with time and cost. The tool developed is based on the case study above, being however open architecture software it can be expanded and applied to other ports and routes. The final outcome will be an easy and user friendly tool with the possibility to alter different input parameters and receive quickly a useful decision support system for the shipper or the logistics providers. Finally there are two loops foreseen for the runs of the program. The required input parameters at each stage are either directly fed to the program if available (e.g vessels ETA and position through GPS, VTS, ETC) or calculated if this is not the case.

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Transport DTU, National Technical University of Athens, Piraeus Port Authority S.A.
Authors: Kapetanis, G. N. (Ekstern), Psaraftis, H. N. (Intern), Spyrou, D. (Ekstern)
Number of pages: 10
Publication date: 2016
Event: Paper presented at 6th Transport Research Arena, Warsaw, Poland.
Main Research Area: Technical/natural sciences
Maritime transport, Multimodality, Synchro-modal transportation, Marine emissions, Transport emissions, Transport cost, Transport time, Transport IT technologies
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Bedre grundlag for samfundsoekonomisk prioritering af trafiksikkerhedsstiltag

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Authors: Møller, M. (Intern), Pilegaard, N. (Intern)
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Main Research Area: Technical/natural sciences

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Journal: Trafik & Veje
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Ratings:
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BFI (2017): BFI-level 1
BFI (2016): BFI-level 1
BFI (2015): BFI-level 1
BFI (2014): BFI-level 1
BFI (2013): BFI-level 1
Betydningen af sociale normer for distraktion under bilkørsel

En amerikansk undersøgelse viser, at sociale normer har betydning for unges involvering i distraherende aktivitet. Interventioner, der støtter forældre i at være gode rollemodeller og bidrager til at korrigere misforståelser angående omfanget af distraherende aktivitet blandt forældre og jævnaldrende kammerater, er derfor yderst relevante.

Bosætningsmønstre i Storkøbenhavn – en model for boliglokalisering og bilejerskab

Viden om, hvordan folk vælger at bosætte sig, er et centralt emne inden for byforskning, og over de seneste år er det blevet muligt at lave simultan-analyser af, hvordan lokaliseringssadfærd påvirker og påvirkes af forskellige politiktiltag og infrastrukturprojekter, samt hvordan lokaliseringsadfærd hænger sammen med udviklingen af byer og urbane områder. Det kan således lade sig gøre at kigge på, hvordan disse forhold påvirker hinanden indbyrdes.

Bounded rational choice behaviour: applications in transport

Even though the theory of rational behaviour has been challenged for almost 100 years, the dominant approach within the field of transport has been based upon the assumptions of neoclassical economics that we live in a world of rational decision makers who always have perfect knowledge and aim to maximise some subjective measure. Where other fields, for example within the social sciences and psychology, have made serious efforts to explore alternative models derived from principles of bounded rationality, this direction has begun to take speed within transport applications only recently.

Bounded rational choice behaviour focuses on how the latter approach can be seriously taken into account within transport applications. As the editors discuss in the introduction, a true optimal choice can only be made if an individual has full and perfect information of all relevant attributes in his/her choice set. An individual is said to demonstrate bounded rational behaviour if he/she does not systematically consider all attributes deemed relevant for the decision problem at hand, does not consider all choice options and/or does not choose the best choice alternative. Such simplified representation and limited processing may occur due to time constraints, low involvement in the decision at hand, relying on habits or the task requiring too high a mental effort.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Jensen, A. F. (Intern)
Pages: 680-681
Publication date: 2016
Main Research Area: Technical/natural sciences

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Web of Science (2018): Indexed yes
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Scopus rating (2016): CiteScore 3.79 SJR 2.09 SNIP 2.371
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.75 SNIP 2.068 CiteScore 3.02
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.942 SNIP 2.447 CiteScore 3.18
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.63 SNIP 1.83 CiteScore 2.58
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.509 SNIP 1.787 CiteScore 2.29
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.421 SNIP 1.921 CiteScore 2
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
Consumer Behavior towards Scheduling and Pricing of Electric Cars Recharging: Theoretical and Experimental Analysis

This article-based dissertation consists of five self-contained chapters. The first chapter presents the motivation of the dissertation and a summary of the four papers containing the dissertation. Three of the chapters are applied microeconomics papers dealing with the economics of recharging electric cars. The last chapter deals with analysis of energy consumption rate and its determinants of electric cars under the hands of customers. A variety of techniques are used including analysis of field data, economics laboratory experiments and theoretical modeling with simulation.

Chapter one presents an introduction to the main parts of the dissertation and a summary of the articles containing the dissertation.

Chapter two, 'The Economics of Workplace Recharging', proposes a microeconomic model of the demand for and supply of recharging facility at workplace (WPC), and uses the approach to shed light on the incentives and barriers employees and employers face when deciding on the demand for and supply of WPC. Using the model and simulation, the paper also examines the existence of WPC market under the current prices, and finds that no WPC contract exists that an employer is willing to offer and, at the same time, that the majority of employees are willing to accept. To overcome the lack of demand for or under-provision of workplace recharging, various remedies are discussed and suggested.

Chapter three, 'Myopic Loss Aversion Behavior under Ultimatum Game Framework in the Scheduling and Pricing of Electric Vehicle Recharging', proposes, and tests at laboratory, contracts about recharging BEVs combining the ultimatum game framework and the myopic loss aversion (MLA) behavioral hypothesis. The model represents the behavior of EV-owners trading-off between the amount of the discount on fee for postponing recharging, the risk of being eligible to the discount and the risk of not recharging the BEV on time for unforeseen trips. Findings from the experiment show that indeed individuals perform decisions exhibiting MLA behavior. The intuition from the result is that presenting time-of-use recharging price as long-term contracts may curtail MLA behavior and help BEV owners to choose cost minimizing recharging time and, simultaneously, may help to reduce BEVs impact on the electricity grid system.

The fourth chapter, 'Using the Peer Effect in Scheduling and Pricing Electric Vehicles Recharging: Laboratory Evidence about Peer Effect in Risk-Taking', presents experimental evidence about peer effect in risk taking in general and, in particular, the use of peer effect in scheduling BEVs recharging. The study investigates whether individuals want to see the choices of others, if observing peers’ choices influences the observers’ choices, to what extent the peer effect is pervasive and who are being influenced by peers’ choices as well as the role the type of peer information plays on peer effects. The results show that a lion share of individuals want to see peers’ choices, but only a moderate percentage of them, mostly those with relatively lower scores in our math test (usually used to test cognitive ability) and lacking self-confidence, use the peers’ choices to revise their intrinsic choices. The results reveal also that the type of peer information plays a significant role in peer effects.

The fifth chapter, ‘Harnessing Big-Data for Estimating the Energy Consumption and Driving Range of Electric Vehicles’, analyzes the electricity consumption of BEVs and its sensitivity to the various driving environments in the hands of customers. The results show that the energy consumption rate of BEVs is highly sensitive to weather conditions and to driving styles. The results may help individuals to make informed decisions about BEV choice, manufacturers to build trust with customers by provide more accurate information, and governments to design policies based on reliable information.

General information
Distraktion er fortsat en risikofaktor

General information
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BFI (2013): BFI-level 1
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
ISI indexed (2010): ISI indexed no
ISI indexed (2009): ISI indexed no
ISI indexed (2008): ISI indexed no
Original language: Danish
Publication: Communication › Journal article – Annual report year: 2016

Distraktion er stadig en markant risikofaktor i trafikken
På foranledning af Rådet for Sikker Trafik har Transport DTU set på den nyeste forskningslitteratur vedrørende distraktion og bilkørsel. I det følgende præsenteres udvalgte resultater.

General information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Drivers of cycling mode-share: analysis of danes travel behavior 1996-2013

Denmark, as Europe's second cycling nation after the Netherlands, has a cycling mode share of around 15% of all trips. Cycling was decreasing slowly through the 1990s into the 2000s, which inspired substantial investments and promotional efforts to reverse the trend. This paper uses Danish micro-level travel survey data series from 1996 through 2013 to analyze the trend in cycling as main or access mode, as well as the significance of background variables representing key spatial and societal trends. The analysis confirms that the general trend in cycling from 1996 to 2013 was negative irrespective of statistical control for socio-economics, ageing, location, urban density, and weather. Results point to an increasing significance of population density over time as well as changes to the effect of location vis-a-vis the largest urban centers. The difference in cycling between central areas and more peripheral areas is growing. Other changes include a decreasing 'income divide' in cycling as well as a decreasing retirement effect. Results are presented and discussed. (C) 2016 Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license.
Effekt af cykeltræningskursus for forældre

I Østrig har man udviklet et kursus, der har det formål at hjælpe forældrene til bedre at kunne træne og vejlede deres børn til at blive sikre cyklister. Kurset er blevet evaluert, og evalueringen tyder på, at kurset både bidrager til at øge forældrene kompetencer og engagement i deres børns cykeltræning samtidig med at børnenes faktiske cykelfærdigheder forbedres. Det anbefales dog at foretage yderligere undersøgelser for at nuancere og cementere de positive resultater.

General information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences

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http://www.trafiksikkerhedsforskning.dtu.dk/arkiv/nr-34/effekt-af-cykelkursus?utm_source=newsletter&utm_media=mail&utm_campaign=
Publication: Communication › Journal article – Annual report year: 2016

Effekten af distraktion ved manuel overtagelse af bilmørslen

En ny undersøgelse tyder på, at reaktionstid ikke er et godt mål for, i hvor høj grad bilmesters kørsel bliver påvirket af distraherende aktiviteter i situationer, hvor bilisten skal overtage kørslen manuelt efter at have kørt i delvist automatiseret tilstand. Forklaringen kan være, at det at gribe efter et rat er en refleksagtig respons, der trækker på andre ressourcer end de kognitive og visuelle ressourcer, der er centrale for at køre sikkert.

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Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences

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http://www.trafiksikkerhedsforskning.dtu.dk/Arkiv/Nr-33/Distraktion-ved-automatiseret-koersel
Publication: Communication › Journal article – Annual report year: 2016

Emergence of an urban traffic macroscopic fundamental diagram

This paper examines mild conditions under which a macroscopic fundamental diagram (MFD) emerges, relating space-averaged speed to occupancy in some area. These conditions are validated against empirical data. We allow local speed-occupancy relationships and, in particular, require no equilibrating process to be in operation. This means that merely observing the stable relationship between the space-averages of speed, flow and occupancy are not sufficient to infer a robust relationship and the emerging MFD cannot be guaranteed to be stable if traffic interventions are implemented.

General information
State: Published
Organisations: Department of Management Engineering, Systems Analysis, Transport DTU, KTH - Royal Institute of Technology
Authors: Ranjan, A. (Intern), Fosgerau, M. (Intern), Jenelius, E. (Ekstern)
Number of pages: 23
Publication date: 2016
Emergency Management involving Critical Infrastructure Disruptions: operationalizing the deployment of resilience capabilities

Recent developments nurturing the importance of Emergency Management (EM) of Critical Infrastructure (CI) brought a shift of emphasis from protecting the systems to building resilience. Resilience approach is required to cope with inevitable events, ensuring ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event. The study proposes a novel approach to integrating the resilience capacities of CI into the EM cycle, which facilitates emergency services and CI operators to collaborate in addressing resilience improvement measures, while planning to cope with CI disruptions. It grounds on a previously published comprehensive framework which reflects the main characteristics of such emergencies (e.g. interdependent, multi-sectoral, multi-stakeholder) and supports the identification, assessment and development of specific technical and organizational capabilities. A pilot application is provided on a real case involving the public and private actors engaged in the Regional Programme on Critical Infrastructure Protection and Resilience (CIP-R) in Lombardy (Italy).

Fodgængervenlige fronter

Risikoen for personskade er stor, når en fodgænger rammes af en bil. Fodgængervenlige fronter anses for at være en måde at bidrage til mindre tilskadekomst blandt fodgængere i trafikken. Denne undersøgelses resultater tyder på, at fodgængervenlige fronter under visse betingelser kan reducere risikoen for at fodgængere får varige mén i forbindelse med et færdselsuheld.

Føreradfærd i delvist selvkørende biler

Førgængervenlige fronter

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Føreradfærd i delvist selvkørende biler

Føreradfærd i delvist selvkørende biler

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Føreradfærd i delvist selvkørende biler

Føreradfærd i delvist selvkørende biler
Green corridors in freight logistics

The subject of this thesis is ‘green corridors,’ a European concept denoting a concentration of freight traffic between major hubs and by relatively long distances. Since their inception in 2007, green corridors have gained popularity as a policy tool that enhances the overall environmental sustainability of transport through improving the competitiveness of the railway and waterborne modes that exhibit better environmental characteristics than road haulage.

The thesis has three objectives, all related to green corridors. The first one aims to develop a methodology for the quantitative monitoring of the performance of a green corridor in terms of pre-specified Key Performance Indicators (KPIs). The thesis builds on previous own work under the EUfinanced SuperGreen project and applies the new methodology on the GreCOR corridor extending from Oslo to Rotterdam. The scope of the two other objectives relates to environmental indicators viewed in the context of maritime corridors. The second objective seeks to develop a simple and practical framework for classifying the carbon emission reduction measures that have been proposed for the shipping industry, while the third one examines the impacts on modal split and emissions of designating the Mediterranean Sea as a Sulphur Emission Control Area (SECA), where stricter limits on the sulphur content of marine fuels apply.

In relation to the first objective, the thesis reviews the most important EU transport policy documents, discusses the available definitions of green corridors, identifies the characteristics that distinguish a green corridor from any other efficient corridor, and uses these characteristics as criteria to investigate the relation between the so-called ‘core network corridors’ of the trans-European transport network and the green corridor concept.

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Once the rationale for a performance monitoring scheme has been established, the thesis critically reviews the SuperGreen methodology which consists of: (i) decomposing the corridor into transport chains, (ii) selecting a sample of typical chains, (iii) assessing these chains through a set of KPIs, and (iv) aggregating the chain-level KPIs to corridor-level ones using proper weights. Unlike SuperGreen that suggests a study-based approach for constructing the corridor sample, the thesis proposes founding the selection of typical chains on the outcome of specialised transport models. The periodic collection of stakeholder data on the selected ‘basket’ of transport services would then enable monitoring progress towards meeting the objectives that corridor management has set.
Green Maritime Logistics

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Transport DTU, National Technical University of Athens
Authors: Psaraftis, H. N. (Intern), Kontovas, C. A. (Ekstern)
Publication date: 2016
Event: Paper presented at 6th Transport Research Arena, Warsaw, Poland.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Paper – Annual report year: 2017

Green maritime transportation: Market based measures
The purpose of this chapter is to introduce the concept of Market Based Measures (MBMs) to reduce Green House Gas (GHG) emissions from ships, and review several distinct MBM proposals that have been under consideration by the International Maritime Organization (IMO). The chapter discusses the mechanisms used by MBMs, and explores how the concept of the Marginal Abatement Cost (MAC) can be linked to MBMs. It also attempts to discuss the pros and cons of the submitted proposals.

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Health impacts of fine particulate matter

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Authors: Panagakos, G. (Intern), Psaraftis, H. N. (Intern), Larsen, A. (Intern)
Publication date: 2016
Hvad ved bilister egentlig om sikkerhedssteknologi i biler?
Potentialet for forbedret trafiksikkerhed gennem sikkerhedssteknologi er stort. En ny amerikansk undersøgelse viser dog, at bilisternes kendskab til og forståelse af hvordan sikkerheds systemerne virker og skal benyttes er begrænset, selv for sikkerhedsudstyr der i dag har stor udbredelse som fx ABS-bremser. Der er således behov for en informationsindsats ikke mindst i lyset af forventningen om stigende udbredelse af sikkerhedssteknologi i bilparken fremover.

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Authors: Møller, M. (Intern)
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Hvem skal overleve?
Konflikter i trafikken er uundgåelige, også selv om de måske bliver minimeret i forbindelse med selvkørende biler. I forbindelse med udviklingen af selvkørende biler, er det derfor nødvendigt, at der udarbejdes nogle principper for, hvordan selvkørende biler skal håndtere forskellige typer af konflikter, herunder de etiske og moralske dilemmaer der kan opstå.

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Indicators and beyond: Assessing the sustainability of transport projects
Credibly demonstrating actual progress towards a genuinely sustainable transport situation remains a challenge. A key problem is that the incorporation of sustainability in transport policy and planning at present is not systematic.
A motivating assumption behind this thesis is that a transition toward a sustainable transport system will require strong support from decision-support processes and assessment tools that do not only adopt the language of sustainability, but fully integrate an explicit notion of sustainability in all of their conceptual, operational and procedural approaches. There is therefore a general need to improve processes, methods and tools applied in transport infrastructure decision making so as to make them more resonant to the needs of both current and future generations corresponding to the fundamental definition of sustainable development.

The core focus of the thesis is on how to ensure project impacts in terms of sustainability are identified and become inputs to decision making.

The benefits of increased mobility based on speed and capacity are significant and visible, creating a wide range of reachable activities for a great number of people. Negative externalities of transport systems such as accidents, local air pollution and noise have long been monetised and accounted for in conventional transport project appraisal. But the transport sector today (in Denmark, in the EU and globally) is also an increasingly large contributor to the two core planetary boundaries of climate change and biosphere integrity. Such wider, more complex and longer terms effects that are also external to local interests and market transactions are not only increasingly observed in transport but are also far less well accounted for. The risk here is that evidence-based decision-making becomes discredited, as was already found to be the case for high-speed rail appraisal in the UK, which is the most important case analysed in this thesis.

This thesis contributes to the following three challenges: the overarching conceptualisation of sustainable development as an ethos for transport infrastructure policy, the operational specifics of impact assessment based on indicators and methods for their prioritisation, and stakeholder representations applied in assessment procedures, with a particular focus on creating an explicit ‘future generations’ viewpoint. The research takes a starting point in Sustainable Transport Indicator Frameworks (STIFs), then expands to decision-support processes and assessment tools, and finally explores issues relevant for the wider field of transport planning and decision-making.

A main underlying concern of the research is to develop new thinking and assessment methods that bridge the technorationalist/instrumental approach of conventional impact assessment tools with a wider communicative planning rationality. This is needed because of the complex, dynamic and interdependent nature of transport planning and decision-making.

Methods

This thesis draws from multiple research methods which are both qualitative and quantitative. For the conceptual work, I rely on purposeful literature reviews, including extensive reviews on sustainability theory and the implication of this body of knowledge for sustainable transport, as well as a detailed review of selected literature on the topic of sustainable transport indicator frameworks. Case study work draws upon extensive desktop-based analysis of impact assessment reports and other publicly available material about real cases of large transport infrastructure appraisals. The HS2 high-speed rail (HSR) project appraisal in the UK is used as a case study in three of the articles that compose this thesis, first because of the long tradition for comprehensive and open appraisal processes in the UK, and second for the significant wider environmental, social and economic impacts of the scheme, which is an opportunity to examine sustainability in the context of transport appraisal in more detail.

The work specifically concerned with the elaboration of assessment tools and decision-support processes is based on an adaptation of multi-criteria analysis tools (MCA) and more particularly on the Multi-Actor Multi-Criteria Analysis (MAMCA) approach, which gives more prominence to the explicit integration of stakeholders in transport project appraisal. Empirical work was conducted ex-post and consists of structured interviews based on online questionnaires following standard MCA steps. Finally in order to complement the research I also conduct exploratory work consisting of face-to-face unstructured interviews and structured observation of passengers’ activities in actual high-speed rail trips in the UK.

Results

The first article in this thesis develops a metaframework for what should inform the analysis and eventually the design of STIFs. The article identifies and describes a total of 21 ‘metacriteria’ that are grouped based on the framework function they are contributing to. Going beyond indicators, this article led to examining in more detail issues related to prioritising sustainability impacts, capturing trade-offs in the long term, and informing strategic sustainable transport choices, which are also relevant for other assessment and decision-support tools.

The second and third articles investigate the conceptual foundations and address the operational challenges in incorporating a sustainability viewpoint using multi-criteria analysis tools (MCA). The nested model of sustainability is found to be a useful approximation of strong sustainability principles when used as guidance for prioritising impacts. However a key contribution of these articles is the implementation of a ‘future generations’ stakeholder in transport appraisal processes, which in turn is proposed as a key feature for sustainable transport appraisal (STA) processes. One practical outcome of the research is a comprehensive list of project impacts for ex-ante assessment of large transport infrastructure projects like HSR. Structured interviews based on an online questionnaire are also found to be well adapted to the challenge of addressing biases in expert- and stakeholder-based assessment methods. This approach provides a means to both address the need for quantifying and comparing complex impacts between various options, and to enable the systematic inclusion of stakeholders, therefore allowing for a level of reflexivity and ‘democratic renewal’ in appraisal processes.

In the fourth article, the issue of trade-offs between the two interrelated issues of biosphere integrity and climate change is investigated in more detail, where it is shown that current state-of-the-art decision-support processes and assessment tools lack formal ways of dealing with complex impacts with local and global implications that unfold over long periods of time. And finally the last article is a more conceptual piece that adopts a critical view on the historic emphasis for minimising travel time in transport planning, and contributes to a better understanding of the value of travel time from a traveller’s perspective. The concept of reasonable travel time (RTT) is introduced, where travel time is reframed based on the traveller’s experience of time in a total door-to-door journey. It is expected that RTT could lead to different thinking about the effectiveness of future transport investments, which is particularly relevant in a technological age where the
overall quality of travel time can bring positive outcomes without necessarily changing the quantity. Taken together, the articles and chapters that compose this thesis contribute to defining the emerging field of 'sustainable transport appraisal'. STA goes beyond the instrumental approach of conventional transport impact assessment methods that attempt to reduce, measure and forecast impacts in a cool, dispassionate way. It does so by adopting sustainability as an explicit goal based on first-order principles, by integrating stakeholder perspectives in the decision-making process, and by incorporating the interests of future generations. Moving from impact assessment tools to appraisal processes means refocusing transport planning on decision-support and decision-making, which are technical and political endeavours that cannot easily be separated.

General information
State: Published
Organisations: Management Science, Department of Management Engineering, Operations Management, Transport DTU
Authors: Cornet, Y. (Intern), Gudmundsson, H. (Intern), Leleur, S. (Intern)
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Publication: Research › Ph.D. thesis – Annual report year: 2017

Infrastructure and spatial effects on the frequency of cyclist-motorist collisions in the Copenhagen Region
Promoting cycling aims at reducing congestion and pollution as well as encouraging healthy and sustainable lifestyles but generally clashes with the perception of crash risk while riding a bicycle that is still the most significant disincentive to cycling. This study sheds light on the factors affecting the probability of cyclist-motorist collisions while accounting for heterogeneity and spatial correlation. The current study analyzed the factors contributing to increase crash risk while riding a bicycle by focusing on 5,349 cyclist-motorist collisions within 269 traffic zones in the Copenhagen Region. The model controlled for traffic exposure for bicycles and motorized transport modes, evaluated the effects of infrastructure and socioeconomic characteristics of the zones, and accounted for heterogeneity and spatial correlation across the zones. A Poisson-lognormal model with second-order conditional autoregressive (CAR) priors confirmed the existence of the safety in numbers phenomenon, contradicted previous literature about bicycle facilities not being helpful in reducing crash risk, highlighted the need for Copenhagen-style bicycle paths especially in suburban areas, and emphasized how heterogeneity and spatial correlation play a significant role in explaining the probability of cyclist-motorist crash occurrence.

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Organisations: Department of Transport, Traffic modelling and planning, Department of Management Engineering, Transport DTU, Danish National Police
Authors: Prato, C. G. (Intern), Kaplan, S. (Intern), Rasmussen, T. K. (Intern), Hels, T. (Ekstern)
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Web of Science (2017): Indexed Yes
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Web of Science (2016): Indexed yes
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ISI indexed (2013): ISI indexed no
Intention to introduce electric vehicles in the commercial sector: A model based on the theory of planned behaviour

Light and heavy duty commercial vehicles are a cause of concern in urban areas because of their cumulative stress on the system in terms of air pollution, congestion, and noise. This cumulative stress is expected to increase with the expected growth in commercial vehicle movements. While electric commercial vehicles (ECVs) may provide a possible technological solution, the research on the market penetration of ECVs is scarce. This study proposes a comprehensive framework for understanding the motivations and barriers of small and medium-size firms to the introduction of ECVs in commercial vehicle fleets. The framework is based on the Theory of Planned Behaviour (TPB), and it is modelled with a structural equation model with latent variables. The model is estimated on the basis of 1443 responses from a large-scale survey in Austria, Denmark, and Germany. The results establish a linkage between the ECV procurement intentions, the TPB constructs (i.e., positive attitudes and subjective norms towards ECVs, familiarity with ECVs and perceived operational ease) and their relative importance. It also provides information regarding the relationship between the TPB constructs and the characteristics of the fleet manager as the individual decision maker, the industrial sector and the fleet management and tour pattern. Last, it provides insights regarding the transferability of the revealed TPB-ECV procurement intentions across industrial sectors and across countries. (C) 2016 Elsevier Ltd. All rights reserved.
Ja, cykelhjelmen beskytter!

Cykelhjelmens trafiksikkerhedsmæssige effekt har været genstand for omfattende debat. Baseret på en gennemgang af videnskabeligt publicerede resultater har to australske forskere lavet en metaanalyse med det formål at skabe et videnskabeligt baseret overblik over den eksisterende viden. Samlet viser metaanalysen, at anvendelse af cykelhjelm har en markant positiv effekt på hovedskader og ansigtsskader blandt tilskadekomne cyklister.

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Kan mobiltelefonen bidrage til bedre trafiksikkerhed?

Mobiltelefonen er kommet for at blive, og rigtige mange bilister benytter den, mens de kører bil. Hvis mobiltelefonens funktioner kan udnyttes til fordel for trafiksikkerheden, rummer det derfor et stort potentiale, fordi det principlielt er muligt at nå ud til mange bilister med begrænsede ressourcer. Som et første skridt på vejen har et ekspertpanel evalueret forskellige apps for at afdække deres trafiksikkerhedsforbedrende potentiale.

**General information**

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LCIA framework and modelling guidance [TF 1 Crosscutting issues]

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Authors: Verones, F. (Ekstern), Henderson, A. D. (Ekstern), Laurent, A. (Intern), Ridoutt, B. (Ekstern), Ugaya, C. (Ekstern), Hellweg, S. (Ekstern)
Pages: 40-57
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Source-ID: 127892714
Publication: Research › Working paper – Annual report year: 2016

Mapping Social Media for Transportation Studies

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Technical University of Munich
Mest trafiksikkerhed for pengene
Ny forskning fra DTU peger på, at det er muligt at forbedre prioriteringen af infrastrukturforbedringer på baggrund af viden om vejenes tilstand, de skønnede udbedringsomkostninger samt uheldsforekomst og alvorlighedsgrad.

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling, Technology and Innovation Management, Systems Analysis
Authors: Janstrup, K. H. (Intern), Møller, M. (Intern), Pilegaard, N. (Intern)
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Publication date: 2016
Main Research Area: Technical/natural sciences

Nytænkning af forebyggelse for unge trafikanter

General information
State: Published
Organisations: Department of Management Engineering, Technology and Innovation Management, Transport DTU
Authors: Møller, M. (Intern)
Pages: 30-30
Publication date: 2016
Main Research Area: Technical/natural sciences

Obligatorisk hjelmbrug giver færre alvorlige hovedskader
I Seattle (USA) har man indført lovpligtig brug af cykelhjelm for cyklister i alle aldersgrupper. En evaluering viser, at lovpligtig hjelmbrug har en positiv effekt på alvorlighedsgraden af hovedskader og dødsfald blandt tilskadekomne cyklister. Forskerne mener dog, at dette kan forklares med en stigning i omfanget af cykling samt en generel stigning i tilskadekomst blandt cyklister.

General information
On the need for integrating LCA into decision making

The need for sustainable solutions has gained attention both in academia and industry research due to increasing demands of human beings, which are incompatible with limitations in resources availability. Several methods, such as Life Cycle Assessment (LCA), were developed in the past decades to assess the environmental profile of products and services. However, when decision makers have several alternatives at hand to solve a problem, environmental performance is not the only criterion for choosing the best alternative. Other criteria such as risks and economical costs and benefits that are associated with the alternatives will also influence the final choice. Sometimes the most environmentally sustainable alternative may not be the safest or cheapest one. How to make a balanced decision considering environmental performance together with other criteria is not straight forward.

Decision analysis is broadly used to help decision makers identify the best solution among alternatives. The decision is based on expected utility generation, which incorporates consequences (or impacts) associated with each alternative. Depending on the research field and goal of the study, the included consequences can be e.g. environmental impacts, property damages from natural hazards and/or human health impacts. We examined the current decision analysis practice as it is applied in different research fields. The review shows that generally environmental impacts are considered less often than the other consequences. Meanwhile, LCA has been applied in many research fields to assess a wide range of environmental impacts associated with products or services. There is a huge potential for integrating LCA into other decisions analysis tools to include assessments of the environmental profile of alternatives. This will provide the possibility of systematical inclusion of environmental considerations in the decision making process, thus facilitating a more holistic decision. However, due to different scopes and purposes of LCA and other decision analysis tools, the integration is not straightforward. The lack of consistency in e.g. system boundaries and handling of uncertainty needs to be carefully managed.
Performance assessment of a freight corridor on the basis of transport model results

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Transport DTU
Authors: Panagakos, G. (Intern), Psaraftis, H. N. (Intern)
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Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Paper – Annual report year: 2017

Planning of Midwives
At a hospital in Denmark around 40 midwives support the pregnancy of approx. 6000 pregnant women every year. Their role is to monitor the pregnancies and prepare the women for labour. Based on the due date of a woman, authority guidelines prescribe specific and mostly rather narrow time windows within which the pregnant woman should have consultations with a midwife. Therefore, once a pregnant woman enters the system, the sequence of consultations for the time period until labour is fairly fixed. There is a clear goal that, as far as possible, each pregnant woman should see the same midwife at every consultation. Every week the newly arrived pregnant women are assigned an arbitrary free time slot belonging to a specific midwife. In turn, this midwife is expected to have consultations with this woman in specific weeks according to the authority guidelines. This random assignment of pregnant women to specific midwives, without any concern to the midwives’ future schedules, means that each midwife has a very unbalanced workload over the year. Furthermore, it means that there is an imbalance between the workloads of the different midwives. The aim of this project is therefore to devise a method that can make a fair distribution of pregnant women among the midwives. The distribution should result in a balanced work load for each midwife and a balanced work load among the midwives while at the same time making sure that the time windows for consultations are not violated.

General information
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Organisations: Department of Management Engineering, Management Science, Operations Research, Transport DTU, Technical University of Denmark
Policy analysis of electricity demand flexibility
The large-scale development of variable renewable energy sources, like wind and solar power, increases the demand for flexibility in power systems. At the same time, their electricity production replaces that of conventional power plants – the traditional suppliers of flexibility, and consequently, a new flexible infrastructure needs to be established. This thesis addresses the policy dimension of the flexibility challenge with a focus on Denmark, a country committed politically in two ways that make it particularly interesting: first, a commitment to renewable energy formulated as a long-term vision of becoming independent of fossil fuels; and second, a commitment to liberalised energy sectors with a notably progressive approach to market-based operations. The crucial question of how it will be possible to balance the Danish electricity system with large amounts of variable renewable production, primarily wind power, is still under debate. To maintain reliability in the most cost-efficient way, a policy strategy aiming at flexibility needs to be developed. Technologically, several different options are available to fulfill the requirement. A part of the solution may be to make use of idle flexibility on the demand side. Its potential could be substantial and technical solutions are available. Still, demand flexibility is largely unutilised and establishing an enabling policy and regulatory framework has been identified as one of the major challenges. While the latest Danish energy policies include a clear commitment to develop an “intelligent” energy system that utilises the flexibility potential of the demand side, a coherent policy strategy covering all aspects of the flexibility challenge has not yet been defined. By use of economic models and concepts of policy analysis, this thesis considers several policy options aiming at demand flexibility in terms of their effectiveness to induce adoption and their efficiency in creating system value while accounting for the specific characteristics of the demand side. The thesis suggests barriers relevant to be addressed due to either market failures in the classic economic sense or systemic failures founded in market design, rules and regulations. The analysis covers impacts of failures stemming from incomplete markets for flexibility and inappropriate regulation that distort the observed value or risks of demand flexibility. Furthermore, it considers various types of transaction costs related to adopting a demand response contract (switching costs) and to activation (monitoring and decision costs). The thesis develops methods to quantify the impacts of these failures and applies them in relation to the Danish case. Switching costs are estimated and found to be a major barrier to the adoption of dynamic pricing schemes in spite of the benefits that could be achieved. As the cost of adoption may be difficult to influence directly, policies may aim at increasing the benefits of flexible demand. One suggested option is to address the issue of incomplete markets and expand market access of flexible demand in the spatial and time dimensions. The value of improving the access of the demand side to intra-hourly reserve markets is found to be substantial. Quantitative findings of the thesis suggest that the reserve value of flexible demand may be significantly higher than the value in hourly spot markets. Another improvement might be achieved by adjusting distortional electricity price elements. It can be shown that value-based taxation, even if applied to smaller portions of the electricity taxes and levies, generates benefits sufficient to exceed switching cost estimates. Monitoring and decision costs can be caused by the complexity of pricing schemes and hamper efficient response. Even though real-time pricing generates the highest benefits in theory, results of the thesis suggest that simplified schemes with minimal monitoring and decision costs would generate around half of the ideal gains and could be deemed sufficiently beneficial during an initial phase. After consumers gained experience with dynamic pricing, they should be transferred to the more complex and efficient schemes, though. Focussing on the installation of automation equipment could be another way to improve the efficiency of response. As this would require investments, the question of risk involved in generating benefits from demand response becomes more relevant. Using a stochastic price model the thesis shows that risk-averse investors might require a significant cost reduction, resulting in lower levels of investment in automation than what could be expected based on average prices. A policy intervention could be considered to initialise adoption, depending on the further technology cost development. Overall, the thesis improves the understanding of the specific challenges that policymaking faces when aiming at better utilisation of demand-side flexibility. It includes aspects that often would remain unanswered in the evaluation of policies. On that basis, it provides support to the development of a coherent policy strategy for flexibility that is required for the successful transition to a fossil-free energy system.

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Resultater fra Improsa-projektet: uhelddomkostninger og effekten af tiltag mod cyklistuheld


Shuttle Planning for Link Closures in Urban Public Transport Networks

Urban public transport systems must periodically close certain links for maintenance, which can have significant effects on the service provided to passengers. In practice, the effects of closures are mitigated by replacing the closed links with a simple shuttle service. However, alternative shuttle services could reduce inconvenience at a lower operating cost. This paper proposes a model to select shuttle lines and frequencies under budget constraints. We propose a new formulation that allows a minimal frequency restriction on any line that is operated and minimizes passenger inconvenience cost, which includes transfers and frequency-dependent waiting time costs. This model is applied to a shuttle design problem based on a real-world case study of the Massachusetts Bay Transportation Authority network of Boston, Massachusetts. The results show that additional shuttle routes can reduce passenger delay compared to the standard industry practice, while also distributing delay more equally over passengers, at the same operating budget. The results are robust under different assumptions about passenger route choice behavior. Computational experiments show that the proposed formulation, coupled with a preprocessing step, can be solved faster than prior formulations.
Suitability of commercial transport for a shift to electric mobility

This paper identifies commercial sectors suitable for a shift to electric mobility. The paper concludes that the construction and the health care service sectors are the most suitable for electric mobility because many vehicles are registered in these sectors and daily mileage is reasonably low. They should be primary target groups of specific policy measures to promote the use of electric vehicles. Denmark has only had a few incentives to promote the use of commercial electric vehicles. Until now electric vehicles do generally not show economic benefits unless travel distance is high. However,
today the travel range of large vans is an important barrier for electrification due to the battery weight and the limitation of 3.5 tonnes gross vehicle weight for driving with a normal driving licence. The rule needs amendments for electric vehicles, as has been done in Germany. The paper recommends EU countries to follow the German rule allowing EVs up to 4.25 tonnes to be driven with a class B licence, thereby potentially creating a market for big electric vans.

The combined contribution of personality, family traits, and reckless driving intentions to young men’s risky driving: What role does anger play?

The study investigated the relation between the risky driving behavior of young male drivers and their personality traits, familial attitudes and conduct in respect to road safety, intentions to drive recklessly, and driving anger. In-vehicle data recorders were used to measure the actual driving of 163 young male drivers, who also completed self-report instruments tapping traits and perceptions. Personality traits were assessed near in time to receipt of the driving license, and actual risky driving and driving-related variables were measured 9–12 months after licensure to examine relatively stable driving behavior and attitudes. Findings indicate that (a) young male drivers’ personality traits and tendencies play a major role in predicting risky behavior; (b) intentions to drive recklessly are translated into actual behavior; and (c) the parental role is extremely relevant and counteracts risky tendencies. Moreover, the results suggest that although trait anger and driving anger both contribute to risky driving, they represent different aspects of anger. Thus, for safety interventions to be effective, they must not only teach drivers how to cope with anger-provoking driving situations, but also address underlying personality traits and environmental factors.
The Danish national passenger model – Model specification and results
The paper describes the structure of the new Danish National Passenger model and provides on this basis a general discussion of large-scale model design, cost-damping and model validation. The paper aims at providing three main contributions to the existing literature. Firstly, at the general level, the paper provides a description of a large-scale forecast model with a discussion of the linkage between population synthesis, demand and assignment. Secondly, the paper gives specific attention to model specification and in particular choice of functional form and cost-damping. Specifically we suggest a family of logarithmic spline functions and illustrate how it is applied in the model. Thirdly and finally, we evaluate model sensitivity and performance by evaluating the distance distribution and elasticities. In the paper we present results where the spline-function is compared with more traditional function types and it is indicated that the spline-function provides a better description of the data. Results are also provided in the form of a back-casting exercise where the model is tested in a back-casting scenario to 2002.
The effect of social networks and norms on the inter-regional migration intentions of knowledge-workers: The case of Saxony, Germany

This study investigates the migration intentions of current and future knowledge-workers in Saxony, Germany. A structural equation model (SEM) is applied to analyze the impact of social networks and norms on inter-regional migration, in addition to lifestyle and utilitarian location factors. The dataset comprises 2731 young knowledge workers. The results show that: (i) migration intentions positively associate with social networks in other cities, subjective norms that West-is better than East-Germany, and that other regions provide better life opportunities; (ii) staying intentions positively relate to having origins, close friends and family in Saxony, and positive consideration of Saxony as an option by the parent; (iii) the structure of the social networks and norms is related to socio-economic characteristics, travel habits, and on-line social networks. (C) 2016 Elsevier Ltd. All rights reserved.

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Scopus rating (2012): SJR 0.828 SNIP 1.293 CiteScore 1.51
ISI indexed (2012): ISI indexed yes
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ISI indexed (2011): ISI indexed yes
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Scopus rating (2010): SJR 0.782 SNIP 1.659
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BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.51 SNIP 0.854
The implications of the new sulphur limits on the European Ro-Ro sector

In an effort to reduce the environmental impacts of maritime transportation, the International Maritime Organization (IMO) designated special Sulphur Emission Control Areas (SECAs) where ships are required to use low-sulphur fuel. In January 2015, the sulphur limit within SECAs was lowered to 0.1%, which can only be achieved if vessels are using pricier ultra-low sulphur fuel, or invest in abatement technologies. The increased operating costs borne by Ro-Ro operators in SECAs due to the stricter limits can result in the shutting down of some routes and a redistribution of cargo flows with land-based alternatives. The exact repercussions of the new sulphur limits are difficult to identify in the wake of significant recent reductions of the fuel prices for both low-sulphur and heavy fuel oil. This paper presents a modal split model that estimates modal shifts vis-à-vis competing maritime and land-based modes available to shippers. This allows examining the implications of the recent low prices to modal choice, and the influence a potential increase in fuel prices may have. The model is applied to seven routes affected by the regulation based on data from a leading European Ro-Ro operator. Sensitivity analyses on market share data, cargo values, freight rates, and haulers rates are conducted. Emissions inventories are constructed to assess the environmental efficacy of the SECA regulation. The novelty of the proposed model lies in the examination of the ex-post implications of shutting down a service and the redistribution of transport. Recommendations to mitigate and reverse the negative side-effects of such environmental legislation are proposed.

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Transport DTU
Authors: Zis, T. (Intern), Psaraftis, H. N. (Intern)
Number of pages: 17
Publication date: 2016
Event: Paper presented at International Association of Maritime Economists (IAME 2016), Hamburg, Germany.
Main Research Area: Technical/natural sciences
Sulphur emission control areas, Maritime emissions, Modal shifts, Ro-Ro shipping
Publication: Research - peer-review › Paper – Annual report year: 2017

Transportation Emissions: some basics
Transportation is the backbone of international trade and a key engine driving globalization. However, there is growing concern that the Earth’s atmospheric composition is being altered by human activities, including transportation, which can lead to climate change. Air pollution from transportation and especially carbon dioxide emissions are at the center stage of discussion by the world community through various international treaties, such as the Kyoto Protocol. The transportation sector also emits non-CO2 pollutants that have important effects on air quality, climate, and public health. The main purpose of this chapter is to introduce some basic concepts that are relevant in the quest of green transportation logistics. First, we present the basics of estimating emissions from transportation activities, the current statistics and future trends, as well as the total impact of air emissions and its contribution to climate change. In addition, this chapter presents the basics of environmental policy measures. In that context, we describe a way to measure the cost-effectiveness of various measures through the so-called Marginal Abatement Cost (MAC). Finally, the chapter deals with the topic of the energy efficiency gap and examines why governments and companies may forego cost-effective investments in energy efficiency, even though they could significantly reduce energy consumption at a lower cost.
Uncertainty in Bus Arrival Time Predictions: Treating Heteroscedasticity With a Metamodel Approach

Arrival time predictions for the next available bus or train are a key component of modern traveler information systems (TISs). A great deal of research has been conducted within the intelligent transportation system community in developing an assortment of different algorithms that seek to increase the accuracy of these predictions. However, the inherent stochastic and nonlinear nature of these systems, particularly in the case of bus transport, means that these predictions suffer from variable sources of error, stemming from variations in weather conditions, bus bunching, and numerous other sources. In this paper, we tackle the issue of uncertainty in bus arrival time predictions using an alternative approach. Rather than endeavor to develop a superior method for prediction, we take existing predictions from a TIS and treat the algorithm generating them as a black box. The presence of heteroscedasticity in the predictions is demonstrated and then a metamodel approach is deployed, which augments existing predictive systems using quantile regression to place bounds on the associated error. As a case study, this approach is applied to data from a real-world TIS in Boston. This method allows bounds on the predicted arrival time to be estimated, which give a measure of the uncertainty associated with the individual predictions. This represents to the best of our knowledge the first application of methods to handle the uncertainty in bus arrival times that explicitly takes into account the inherent heteroscedasticity. The metamodel approach is agnostic to the process generating the predictions, which ensures the methodology is implementable in any system.
Underreporting traffic crash under-reporting: Linking police and medical records to individual and crash characteristics

Objective: This study aligns to the body of research dedicated to estimating the underreporting of road crash injuries and adds the perspective of understanding individual and crash factors contributing to the decision to report a crash to the police, the hospital, or both. Method: This study focuses on road crash injuries that occurred in the province of Funen, Denmark, between 2003 and 2007 and were registered in the police, the hospital, or both authorities. Underreporting rates are computed with the capture–recapture method, and the probability for road crash injuries in police records to appear in hospital records (and vice versa) is estimated with joint binary logit models. Results: The capture–recapture analysis shows high underreporting rates of road crash injuries in Denmark and the growth of underreporting not only with the decrease in injury severity but also with the involvement of cyclists (reporting rates of about 14% for serious injuries and 7% for slight injuries) and motorcyclists (reporting rates of about 35% for serious injuries and 10% for slight injuries). Model estimates show that the likelihood of appearing in both data sets is positively related to helmet and seat belt use, number of motor vehicles involved, alcohol involvement, higher speed limit, and females being injured. Conclusions: This study adds significantly to the literature about underreporting by recognizing that understanding the heterogeneity in the reporting rate of road crashes may lead to devising policy measures aimed at increasing the reporting rate by targeting specific road user groups (e.g., males, young road users) or specific situational factors (e.g., slight injuries, arm injuries, leg injuries, weekend).
Using internet search queries to predict human mobility in social events

While our transport systems are generally designed for habitual behavior, the dynamics of large and mega cities systematically push it to its limits. Particularly, transport planning and operations in large events are well known to be a challenge. Not only they imply stress to the system on an irregular basis, their associated mobility behavior is also difficult
to predict. Previous studies have shown a strong correlation between number of public transport arrivals with the semi-structured data mined from online announcement websites. However, these models tend to be complex in form and demand substantial information retrieval, extraction and data cleaning work, and so they are difficult to generalize from city to city. In contrast, this paper focuses on enriching previously mined information about special events using automated web search queries. Since this context data comes in unstructured natural language form, we employ supervised topic model to correlate it with real measurements of transport usage. In this way, the proposed approach is more generic and a transit agency can start planning ahead as early as the event is announced on the web. The results show that using information mined from the web search not only shows high prediction accuracy of public transport demand, but also potentially provides interesting insights about popular event categories based on extracted topics.

General information
State: Published
Organisations: Department of Management Engineering, Transport Modelling, Transport DTU, KTH - Royal Institute of Technology, Singapore–Massachusetts Institute of Technology (MIT), Los Alamos National Laboratory
Authors: Borysov, S. (Ekstern), Lourenco, M. (Ekstern), Rodrigues, F. (Intern), Balatsky, A. (Ekstern), Pereira, F. C. (Intern)
Number of pages: 6
Pages: 1342-1347
Publication date: 2016

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Publisher: IEEE
Main Research Area: Technical/natural sciences
Data models, Predictive models, Internet, Urban areas, Web search, Planning
DOIs:
10.1109/ITSC.2016.7795731
Source: FindIt
Source-ID: 2350291944
Publication: Research - peer-review › Article in proceedings – Annual report year: 2016

What does the Tourism Demand Survey tell about long distance travel
Long distance travel is one of the fastest increasing travel activities with a very high impact on the climate. Nevertheless the demand is scarcely documented from a transport perspective, nationally as well as internationally and policies to reduce the increase in demand are seldom addressed. This is in sharp contrast to the substantial public and private investments in infrastructure and transport modes for long distance travel by air as well as rail. Furthermore, it is a problem related to the serious environmental impact from air travel (Alonso et al., 2014; Christensen, 2016; Aamaas et al., 2013)
The need for more research is therefore obvious. The aim of our paper is to get more knowledge of the development in European travel activity to better understand if there are any possible limits to the increase in long distance travel.

General information
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Organisations: Transport DTU, Transport Modelling, Department of Management Engineering
Authors: Christensen, L. (Intern), Nielsen, O. A. (Intern)
Number of pages: 28
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Main Research Area: Technical/natural sciences
Electronic versions:
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Source-ID: 141917532
Publication: Research - peer-review › Paper – Annual report year: 2017

Big Data fra jord til bord
Danske landmænd og virksomhederne i fødevaresektoren har gode forudsætninger for at drage nytte af den rivende udvikling inden for indsamling og bearbejdning
af data:
• Danmark har en stærk fødevaresektor. Det skyldes bl.a., at alle dele af værdikæden arbejder tæt sammen. Fra primærproducererne, over forarbejdning industrien, agroindustrien til videns- og forskningsmiljøerne. Effektiv ressourceudnyttelse og fokus på optimering i hele værdikæden gør sektoren i stand til at konkurrere på verdensmarkedet.
• Danske fødevarevirksomheder har altid været gode til at opdyrke nye forretningsmodeller og finde nye innovative veje til øget værdiskabelse. For eksempel gennem smartere måder at producere på, levere produkterne på eller at indarbejde større værdi i produkterne, så de kan sælges med større fortjeneste.
• Dansk landbrug og hele værdikæden i fødevaresektoren producerer store mængder af data. Det skyldes bl.a. et høj automationsniveau og myndighedernes krav til dokumentation af fødevarekvaliteten, når de danske producenter leverer fødevarer til forbrugerne verden over. Der er imidlertid et stort spring fra at råde over store mængder af data til at bruge dem aktivt i forretningsudviklingen. Denne rapport viser, hvordan Big Data kan være ét af omdrejningspunkter.

General information
State: Published
Organisations: Office for Innovation & Sector Services, Department of Applied Mathematics and Computer Science, Statistics and Data Analysis, National Food Institute, Division of Risk Assessment and Nutrition, Research Group for Analytical Food Chemistry, National Veterinary Institute, Epidemiology, Department of Management Engineering, Management Science, Transport DTU, Operations Management, Department of Bio and Health Informatics, IT Service, High Performance Computing, DI Itæk, Landbrug og Fødevarer, City Pressekantor
Number of pages: 60
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Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:
Big_Data_fra_jord_til_bord_Sektorudviklingsrapport_DTU.pdf
Publication: Communication › Report – Annual report year: 2015

Demand for long distance travel - a fast increasing but scarcely documented travel activity. Illustrated by Danish travel behaviour and compared with the other European analyses

General information
State: Published
Organisations: Department of Management Engineering, Transport DTU, Transport Modelling
Authors: Christensen, L. (Intern)
Publication date: 2015
Main Research Area: Technical/natural sciences
Electronic versions:
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Source: PublicationPreSubmission
Source-ID: 141917670
Publication: Research › Paper – Annual report year: 2015

Does improving Public Transport decrease Car Ownership? Evidence from the Copenhagen Metropolitan Area
Car ownership is lower in urban areas, which is probably related to the availability of better public transport. Better public transport thus may offer the possibility to relieve the many problems (congestion, health, and parking) associated with the presence of cars in urban areas. To investigate this issue, we develop and estimate a model for the simultaneous choice of residential area and car ownership. The model is estimated on Danish register data for single-earner and dual-earners households in the greater Copenhagen metropolitan area. We pay special attention to accessibility of the metro network which offers particularly high quality public transport. Simulations based on the estimated model show that for the greater Copenhagen area a planned extension of the metro network decreases car ownership by 2-3%. Our results suggest also a substantial increase in the interest for living in areas close to the metro network, that affects the demographic composition of neighbourhoods.

General information
State: Published
Organisations: Department of Transport, Transport policy and behaviour, Department of Management Engineering, Systems Analysis, Transport DTU, Vrije Universiteit Amsterdam
Green maritime transportation: Speed and route optimization

Among the spectrum of logistics-based measures for green maritime transportation, this chapter focuses on speed optimization. This involves the selection of an appropriate speed by the vessel, so as to optimize a certain objective. As ship speed is not fixed, depressed shipping markets and/or high fuel prices induce slow steaming which is being practised in many sectors of the shipping industry. In recent years the environmental dimension of slow steaming has also become important, as ship emissions are directly proportional to fuel burned. Win-win solutions are sought, but they will not necessarily be possible. The chapter presents some basics, discusses the main trade-offs and also examines combined speed and route optimization problems. Some examples are finally presented so as to highlight the main issues that are at play.

Maritime Transportation

General information
State: Published
Organisations: Department of Management Engineering, Management Science, Transport DTU
Authors: Psaraftis, H. N. (Intern)
Pages: 321-333
Publication date: 2015
Robustness indicators and capacity models for railway networks
In a world continuous striving for higher mobility and the use of more sustainable modes of transport, there is a constant pressure on utilising railway capacity better and, at the same time, obtaining a high robustness against delays. During the planning of railway operations and infrastructure this can be assisted by improving decision support systems to enable planners to use their time more efficiently. In the context of strategic (long-term) planning, efficient decision-support tools translate into being able to evaluate infrastructure and timetable scenarios fast with little data input. This has motivated the research conducted and described in this thesis, where the objective has been to develop and improve existing methods to achieve timetable and infrastructure plans with robust capacity utilisation aimed at the strategic and early tactical planning phases.

Role of Social Climate in Habitual Transit Use by Young Adults to Work and Leisure Activities Evidence from Colombia and Mexico: Evidence from Colombia and Mexico
As mobility has increasingly become a vehicle for producing meaning and culture, and public transport has traditionally formed a dense and diverse social climate in which social interactions habitually occur, assessing the relationship between social climate and transit use is extremely important, especially in the younger populations that will shape the future of transport systems. This study proposes a behavioral framework founded on the theory of planned behavior and the social climate model. The study presents a tailor-made, web-based survey and a structural equation model for analyzing transit use as a function of attitudes toward public transport, subjective norms, social ambience in public transport, travel independence and autonomy, family (house) rules, and perceived quality of service. This study focuses on transit systems in cities in North and South America that have a much higher public transport ridership, tighter design standards in terms of personal space, and a higher degree of informal social interaction than transit systems in Europe, where previous studies have been conducted. Estimation results from a structural equations model show that (a) transit use frequency is significantly related to the perceived behavioral control of using transit and the social climate; (b) attitudes, norms, and perceived behavioral control are associated with perceived service quality; (c) gender differences exist in the user experience and appreciation of the social climate in transit; and (d) the residential social climate is linked to the transit social climate.
Ratings:

BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.75 SJR 0.494 SNIP 0.722
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.547 SNIP 0.769 CiteScore 0.6
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.529 SNIP 0.8 CiteScore 0.58
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.608 SNIP 0.877 CiteScore 0.76
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.522 SNIP 0.907 CiteScore 0.6
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.428 SNIP 0.999 CiteScore 0.72
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.398 SNIP 0.959
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.393 SNIP 0.79
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.392 SNIP 0.747
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.377 SNIP 0.728
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.389 SNIP 0.837
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.281 SNIP 0.791
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.402 SNIP 0.867
Scopus rating (2003): SJR 0.318 SNIP 0.839
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.295 SNIP 0.777
Scopus rating (2001): SJR 0.259 SNIP 0.719
Scopus rating (2000): SJR 0.245 SNIP 0.564
Scopus rating (1999): SJR 0.292 SNIP 0.671

Original language: English

Civil and Structural Engineering, Mechanical Engineering, Behavioral research, Frequency estimation, Mass transportation, Quality control, Quality of service, Social sciences, Behavioral framework, Leisure activities, Perceived behavioral control, Perceived service qualities, Social interactions, Structural equation modeling, Structural equations modeling, Theory of Planned Behavior, Climate models, ENGINEERING,, TRANSPORTATION, PUBLIC TRANSPORT, BEHAVIOR, TRAVEL

DOIs:
Slow Steaming in Maritime Transportation: Fundamentals, Trade-offs, and Decision Models
Slow steaming is being practised in many sectors of the shipping industry. It is induced principally by depressed shipping markets and/or high fuel prices. In recent years the environmental dimension of slow steaming has also become important, as ship emissions are directly proportional to fuel burned. The purpose of this chapter is to examine the practice of slow steaming from various angles. In that context, a taxonomy of models is presented, some fundamentals are outlined, the main trade-offs are analysed, and some decision models are presented. Some examples are finally presented so as to highlight the main issues that are at play.

Speed Optimization for Green Maritime Logistics: Status and Prospects
Market based measures concerning air emissions from ships are very likely to be introduced in the next years, in an effort to cap Greenhouse Gas Emissions from ships. A lot of countries have presented their proposals to IMO and practically the majority of them are based on a form of a fuel price penalty for the existing ships. In this paper the proposal for a Global Emissions fund will be presented and discussed as the most appropriate, easy to implement and flexible solution for an enforcement of a market based measure. At a second stage and using the emissions calculation and speed optimisation tool developed within the Laboratory for Maritime Transport of the National Technical University of Athens, simulations will be performed for a specified Bulk carrier and the corresponding to its fleet segment. A bunker levy will be implemented in the program and its effects will be studied in terms of speed and transportation work. For this purpose the tool is run for both cases, i.e. single ship and fleet segment, and for two different years 2009 and 2010 with and without the bunker levy.

Estimating the Operational Effect of a Bunker Levy: The Case of Handymax Bulk Carriers
Market based measures concerning air emissions from ships are very likely to be introduced in the next years, in an effort to cap Greenhouse Gas Emissions from ships. A lot of countries have presented their proposals to IMO and practically the majority of them are based on a form of a fuel price penalty for the existing ships. In this paper the proposal for a Global Emissions fund will be presented and discussed as the most appropriate, easy to implement and flexible solution for an enforcement of a market based measure. At a second stage and using the emissions calculation and speed optimisation tool developed within the Laboratory for Maritime Transport of the National Technical University of Athens, simulations will be performed for a specified Bulk carrier and the corresponding to its fleet segment. A bunker levy will be implemented in the program and its effects will be studied in terms of speed and transportation work. For this purpose the tool is run for both cases, i.e. single ship and fleet segment, and for two different years 2009 and 2010 with and without the bunker levy.
How green are the TEN-T core network corridors?

“Green corridors” is a concept introduced by the European Commission to enhance the provision of sustainable freight transport logistics services by concentrating freight traffic between major hubs and by relatively long distances. SuperGreen, a Coordination and Support Action aiming at further defining this concept, identified the characteristics that distinguish a green corridor from an otherwise efficient one. The main thesis of this paper is that the “core network corridors” of the new TEN-T guidelines exhibit all these qualities and the vision of a green corridor network in Europe is close to reality. To support this thesis, and in continuation of the work of SuperGreen, the paper examines the proposed new „guidelines“ for the development of the TEN-T after presenting a brief history of transport network development in Europe.

Methodology for Building LCA-compliant National Inventories of Emissions and Resource Extraction

This paper presents a stylized econometric model for the demand for on-street parking with focus on estimation of the elasticity of demand with respect to the full cost of parking. The full cost of parking consists of a parking fee and the cost of...
searching for a vacant parking space (cruising). The cost of cruising is usually unobserved. Ignoring this issue implies a downward bias of the elasticity of demand with respect to the total cost of parking since the cost of cruising depends on the number of cars parked. We also demonstrate that, even when the cost of cruising is unobserved, the demand elasticity can be identified by extending the econometric model to include the spatial interaction between the parking facilities. We illustrate the model with on-street parking data from Copenhagen and Önd indications of a somewhat greater parking demand elasticity than is usually reported in the literature.

General information
State: Published
Organisations: Department of Transport, Transport policy and behaviour, Department of Management Engineering, Systems Analysis, Transport DTU
Authors: Madsen, E. (Intern), Mulalic, I. (Intern), Pilegaard, N. (Intern)
Number of pages: 24
Publication date: 2013

Publication information
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Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Working paper – Annual report year: 2013

Projects:

Cyber Resilience for the Shipping industry
The CyberShip project is aimed at providing shipping companies and regulators with a reference framework and decision support model to better cope with disruptions originating from a cyber-attack.
Department of Management Engineering
Management Science
Transport DTU
Operations Management
Department of Applied Mathematics and Computer Science
Cyber Security
Copenhagen Center for Health Technology
Period: 01/09/2017 → 31/08/2019
Number of participants: 4
Acronym: CyberShip
Project participant:
Psaraftis, Harilaos N. (Intern)
Jensen, Christian D. (Intern)
Sepúlveda Estay, Daniel Alberto (Intern)
Project Manager, organisational:
Barfod, Michael Bruhn (Intern)

Smart Load
The increasing capacity of container vessels is pressuring container terminals worldwide to improve their performance. Simple improvements of work practices are no longer a viable option even for the medium and small container terminals we find in Denmark. With this project we wish to initiate a pilot study on the possibility of improving terminal performance by exploiting the flexibility that arises from a possible collaboration between the terminal planners and the ship owners. A preliminary study, done in collaboration with APM Terminals – Cargo Service A/S (APMT) in Aarhus, has shown that giving the terminal some decision power over the arrangement of the containers in the vessel can result in improved vessel handling times. With this research application we wish to initiate a pilot project that can demonstrate the potential of this collaboration on an industrial scale. In order to do so, APMT has agreed to provide data and domain expertise to the research team at the Technical University of Denmark (DTU), and be an active partner in this project. The research team envision the use of operation research methods to optimize the new planning problems that arise from this collaboration.
Department of Management Engineering
The use of larger vessels is increasing the planning complexity of stowage coordinators. Stowage planning main goal is to find an arrangement of the containers such that time at port is minimised. In order to do so, stowage coordinators must ensure that situations where containers going to later ports are stowed on top of containers to be discharged earlier. Such containers are called overstowing containers. A worse situation appears when overstowing containers are in between hatch-covers (metallic structures dividing the upper and lower deck). In this situation, a container terminal is forced to remove all containers above the hatch, lift the hatch itself, to then finally discharge the needed containers. Such a situation is clearly undesirable. Aside from the minimization of container moves, it is also important that the stowage plans are designed for efficient port operations. Liner shippers and container terminals, often, agree on an expected cargo handling performance (often in terms of container moves per hour). Stowage coordinators must, to the best of their ability, generate stowage plans tailored to the agreed terminal performance. This is not an easy task since cargo loaded in earlier ports can have a large negative impact on handling operations in later ports. Even though those objectives in themselves are complex to achieve, stowage coordinators also need to ensure the sea-worthiness of the vessel. Weight balance, stress forces, handling of dangerous cargo and stacking constraints are but a few examples of the rules that a stowage plan must obey. The possibility of cost reduction, by use of optimisation techniques, are not small. Consider the number of containers Maersk has moved in this year’s first quarter (ca. 2.500 thousand FFU), and assume a total of just 5% of overstowing containers. A conservative price of 60,00 USD per re-stow will result in an estimated cost of 60 mils. USD. It is easy to see that even a small percent reduction of the overstowing containers would bring savings in the order of millions.

This project has two main goals:
1. Reinforce the Danish status of being the top research country for stowage planning
2. Produce research results that can have an impact on the Danish maritime industry

Wrt. to 1) we wish to become the main authority in terms of stowage planning research in the world. Our research results so far have granted us the respect of many maritime researchers. As the main researchers on stowage planning we have the responsibility of setting the correct research standard. The amount of knowledge on stowage planning of the applicants and of the Danish maritime industry places Denmark in a unique position to do so. Wrt. 2) we believe that applied research must have an impact. We, therefore, have engaged in a partnership with Optivation, and through them, Seago Line (part of the Maersk consortium), to help us in guiding the project toward solutions tailored for the industry.

Access to shared cars may facilitate living without a private car in the household, fewer private cars can pave the way for more sustainable transport patterns, while better opportunities to choose and combine transport modes may enhance
multimodal transport chains.

Several international studies indicate positive environmental effects of car-sharing services but many of these studies are solely based on retrospective data or miss a control group.

Based on a longitudinal survey including both DriveNow users and non-users, the project will
(1) examine the effects of free-floating car-sharing in the Capital Region with regard to car use and ownership and related intentions and attitudes;
(2) monitor the awareness and use of the system; and
(3) examine possibilities for system improvements.

Department of Management Engineering
Technology and Innovation Management

Transport DTU
Period: 04/05/2016 → 30/11/2019
Number of participants: 1
Project participant:
Haustein, Sonja (Intern)
Project

Bedre Uheldsdata
Department of Management Engineering
Transport DTU
Technology and Innovation Management

Transport Modelling
Period: 01/01/2016 → 01/11/2017
Number of participants: 3
Project participant:
Janstrup, Kira Hyldekær (Intern)
Clemmensen, Mikkel Bøg (Intern)
Project Manager, academic:
Møller, Mette (Intern)

Relations
Activities:
Bedre uheldsdata
Documents:
Bedre trafikuheldsdata

Model til vurdering af infrastruktureffekter på trafikuheld
Department of Management Engineering
Transport DTU
Technology and Innovation Management
Systems Analysis
Period: 01/01/2016 → 31/12/2018
Number of participants: 3
Project participant:
Janstrup, Kira Hyldekær (Intern)
Pilegaard, Ninette (Intern)
Project Manager, organisational:
Møller, Mette (Intern)

Relations
Activities:
Vejens skadespoint og trafiksikkerhed - Er der behov for et nyt skadespoint, som kan benyttes som trafiksikkerhedsindikator?
Asfaltindustriens valgmøde i Køge
Asfaltindustriens valgmøde i Odense
Cyklistuheld – hvilken betydning har vejen, køretøjet og trafikanten
Asfaltindustriens valgmøde i Guldborgsund
Asfaltindustriens valgmøde i Aarhus
Sammenhængen mellem vejenes tilstand, ulykker og samfundsøkonomi
Trafiksikkerhed som grundlag for bedre prioritering af vejvedligehold
Samfundsøkonomiske konsekvenser af trafiksikkerhed

**Mobilteitspotentiale for Aarhus Letbane**
Department of Management Engineering
Management Science
Transport DTU
Operations Management
Operations Research
Office for Finance and Accounting
Period: 01/01/2016 → 01/01/2017
Number of participants: 5
Project participant:
Barfod, Michael Bruhn (Intern)
Kronbak, Jacob (Intern)
Larsen, Rune (Intern)
Pedersen, Thomas Ross (Intern)
Olsen, Allan (Intern)

**Mobilteitsundersøgelse af arbejdspadser i Loopcity**
Department of Transport
Transport policy and behaviour
Data- and Modelcenter
Department of Management Engineering
Transport DTU

Period: 01/11/2015 → 31/10/2016
Number of participants: 3
Acronym: MOOP
Project participant:
Warnecke, Marie-Louise (Intern)
Christiansen, Hjalmar (Intern)
Nielsen, Thomas Alexander Sick (Intern)

**Omkostninger i Godstransportkæder**
Department of Management Engineering
Management Science
Operations Management
Green REgion for Alternative fuels for Transport
The GREAT project will make TEN-T Scandinavian-Mediterranean Corridor between Hamburg and Oslo/Stockholm one of the first to meet the EU’s directive for alternative fuels. The project will contribute to the decarbonisation of the transport sector, and therefore has the potential to make the corridor an EU best-practice example on how to meet environmental and climate challenges. The unique combination of regional public authorities and private companies working together creates opportunities for new and dynamic developments.

The project takes a holistic approach to promote all kinds of alternative fuels for road transport. It targets end users in a unique collaboration between the public sector, private providers of alternative fuels and vehicle manufacturers.

The project will highlight the business models of alternative fuels infrastructure to speed up the decarbonisation of road transport.

The overall goal is to reduce fossil emissions by establishing a strongly increased market demand for alternative fuels transport solutions by ensuring access to supply over the long distances between metropolises in northern Europe.

The successful introduction of cleaner transportation solutions on a large scale remains critical to the current European Union goals for reducing reliance on fossil fuels and their effect on the environment.

GREAT is divided into the following activities:

Activity 1: Project Management
Activity 2: Communication and Dissemination
Activity 3: Implementation of pilot infrastructure - E-Mobility
Activity 4: Implementation of pilot infrastructure – LNG
Activity 5: Study – Policy Measures
Activity 6: Study – Business Models
Activity 7: Study – Evaluation, Assessment and Future Development

DTU is leader of Activity 7.

Department of Management Engineering
Technology and Innovation Management

*Ta’ cyklen Danmark* – Effect evaluation
“Go cycling Denmark” is a campaign based project with a variety of promotional activities to encourage Danes to cycle (more). The campaign’s overall objective is to reach a 1% increase in the number of bicycle trips nationwide. Promotional activities include among others an application for smartphones, which is a digital cycling coach that encourages cycling by
setting realistic goals, registering cycling trips, and following-up on the goals.

The project runs over three years and will then be evaluated with regard to the effect on cycling (effect evaluation), the impact on health and economy and the process. DTU is responsible for the effect evaluation. The effect evaluation is based on four data sources:

(1) Repeated surveys on the awareness of the campaigns, mobility behaviour and attitudes in a sample of the total population
(2) Data of the cycling app and online questionnaires to app users
(3) Data of the Danish national travel survey
(4) Documentation of all campaign activities (time, regional distribution)

Spatial and temporal variations in the campaign activity will be related to cycling frequency based on the different data sources as a basis for the effect analysis.

Department of Management Engineering
Technology and Innovation Management
Transport DTU

Period: 01/11/2014 → 31/03/2018
Number of participants: 1
Project Manager, academic:
Haustein, Sonja (Intern)

Activities:

Danish Road Safety Commission/Færdselssikkerhedskommissionen (Event)
Period: 2018 → …
Mette Møller (Member)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Description
Danish Road Safety Commission/Færdselssikkerhedskommissionen
Degree of recognition: National
Links:
http://www.faerdselssikkerhedskommissionen.dk/

Related event

Danish Road Safety Commission/Færdselssikkerhedskommissionen
15/01/2018 → 14/01/2022
Activity: Membership › Board duties in companies, associations, or public organisations

6th AAAI Conference on Human Computation and Crowdsourcing (HCOMP 2018) (Event)
Period: 5 Jul 2018 → 8 Jul 2018
Filipe Rodrigues (Member)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
Program committee member
Degree of recognition: International

Related event
Workshop om lysreklamer
Period: 14 Mar 2018
Mette Møller (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Description
Adfærd og forskning i forhold til lysreklamer

Related organisation
Workshop om lysreklamer
Møller, M. (Speaker)
14 Mar 2018
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

XI ICTCT Workshop "Improving the safety of vulnerable road users"
Period: 8 Mar 2018 → 9 Mar 2018
Mette Møller (Panel member)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Degree of recognition: International

Related organisation
XI ICTCT Workshop "Improving the safety of vulnerable road users"
Møller, M. (Panel member)
8 Mar 2018 → 9 Mar 2018
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Deep Learning from Crowds
Period: 2 Feb 2018 → 7 Feb 2018
Filipe Rodrigues (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event
The Thirty-Second AAAI Conference on Artificial Intelligence (AAAI), 2018
02/03/2017 → 07/03/2018
Activity: Talks and presentations › Conference presentations

Hong Kong Polytechnic University
Period: 22 Jan 2018 → 26 Jan 2018
Harilaos N. Psaraftis (Visiting researcher)
Department of Management Engineering
Management Science
Transport DTU
Operations Management

**Description**
My final visit as Departmental Academic Advisor, Department of Logistics and Maritime Studies. Term was 2012 to 2018.
Degree of recognition: International
Activity: Visiting an external institution › Visiting another research institution

**Factors contributing to Bicycle accidents in Denmark - a study based on medical records**
Period: 10 Jan 2018
Mette Møller (Speaker)
Kira Hyldekær Janstrup (Other)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Transport Modelling

**Description**
Presentation at IRTAD/NHTSA Session at TRB conference in Washington DC

**Related event**
TRB 97th Annual Meeting: Analysis of International Road Safety Data
07/01/2018 → 11/01/2018
United States
Activity: Talks and presentations › Conference presentations

**Predicting for the adaptive transport system and other necessary ingredients for resilient urban mobility**
Period: 15 Dec 2017
Filipe Rodrigues (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

**Related event**
Leveraging Big Data for Future Mobility Workshop
15/12/2017 → 15/12/2017
Munich, Germany
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

**Integrated Optimisation for Public Transport System with Joint Schedule- and Frequency-based Services**
Period: 11 Dec 2017
Yu Jiang (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

**Description**
22nd HKSTS Conference
Degree of recognition: International

**Related external organisation**
Bedre uheldsdata
Period: 6 Dec 2017 → 7 Dec 2017
Kira Hyldekær Janstrup (Other)
Mette Møller (Speaker)
Mikkel Bøg Clemmensen (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Technology and Innovation Management
Documents:
Bedre trafikuheldsdata

Related event

Vejforum 2005
01/01/2005 → ...
Nyborg Strand, Danmark
Activity: Talks and presentations › Conference presentations

Vejens skadespoint og trafiksikkerhed - Er der behov for et nyt skadespoint, som kan benyttes som trafiksikkerhedsindikator?
Period: 6 Dec 2017 → 7 Dec 2017
Kira Hyldekær Janstrup (Speaker)
Mette Møller (Other)
Ninette Pilegaard (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Technology and Innovation Management
Systems Analysis

Related event

Vejforum 2005
01/01/2005 → ...
Nyborg Strand, Danmark
Activity: Talks and presentations › Conference presentations

31st Conference on Neural Information Processing Systems
Period: 4 Dec 2017 → 9 Dec 2017
Filipe Rodrigues (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event

31st Conference on Neural Information Processing Systems
04/12/2017 → 09/12/2017
Long Beach, United States
Activity: Attending an event › Participating in or organising a conference

Transformation of India's Transport Sector under global warming of 2°C and 1.5°C scenario
Period: 22 Nov 2017
Subash Dhar (Invited speaker)
Department of Management Engineering
Transport DTU
UNEP DTU Partnership
Degree of recognition: International
Documents:
Paris Agreement and Transport Scenarios Subash Dhar

Related event
Annual Chair Conference: Prospective for Energy-Climate Issues
22/11/2017 → 22/11/2017
Paris, France
Activity: Talks and presentations › Conference presentations

Accident Analysis & Prevention (Journal)
Period: 15 Nov 2017 → …
Kira Hyldeær Janstrup (Reviewer)
Department of Management Engineering
Transport DTU
Transport Modelling
Description
Reviewer
Degree of recognition: International

Related journal
Accident Analysis & Prevention
0001-4575
Web of Science (2018): Indexed yes
Central database
Activity: Research › Peer review of manuscripts

Asfaltindustriens valgmøde i Aarhus
Period: 7 Nov 2017
Kira Hyldeær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
Asfaltindustriens valgmøder
25/10/2017 → 07/11/2017
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

10th Urban Mobility Conference and Expo 2017
Period: 4 Nov 2017
Subash Dhar (Organizer)
Department of Management Engineering
Transport DTU
UNEP DTU Partnership

Description
A Study of Electric Mobility for City of Hyderabad
Degree of recognition: International
Documents:
UMI - Electric Mobility Hyderabad Final

Related event
10th Urban Mobility Conference and Expo 2017
04/11/2017 → 06/11/2017
Hyderabad, India
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

Asfaltindustriens valgmøde i Guldborgsund
Period: 1 Nov 2017
Kira Hyldekaer Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
Asfaltindustriens valgmøder
25/10/2017 → 07/11/2017
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Role of Energy Efficiency for Low Carbon Transformation of India
Period: 1 Nov 2017 → 3 Nov 2017
Subash Dhar (Guest lecturer)
Department of Management Engineering
Transport DTU
UNEP DTU Partnership
Degree of recognition: International
Documents:
Role of EE LCT India _01Nov

Related event
3rd International Conference of Low Carbon Asia & Beyond,
01/11/2017 → 03/11/2017
Bangkok, Thailand
Activity: Talks and presentations › Conference presentations

Asfaltindustriens valgmøde i Køge
Period: 26 Oct 2017
Kira Hyldekaer Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event

Asfaltindustriens valgmøder
25/10/2017 → 07/11/2017
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Asfaltindustriens valgmøde i Odense
Period: 25 Oct 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: National

Related event

Asfaltindustriens valgmøder
25/10/2017 → 07/11/2017
Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Network performance of autonomous cars at low market shares
Period: 14 Sep 2017
Andrea Vanesa Papu Carrone (Speaker)
Jeppe Rich (Other)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
In this paper we consider how network performance is affected by a mixture of two heterogeneous car classes, a class which is designed to mimic the behaviour of autonomous vehicles (AVs) and a class which is designed to mimic normal driver behaviour. This makes it possible to investigate network effects as a function of the market shares of AVs.
Degree of recognition: International

Related event

hEART 2017: 6th Symposium of the European Association for Research in Transportation
12/09/2017 → 14/09/2017
Haifa, Israel
Activity: Talks and presentations › Conference presentations

hEART 2017: 6th Symposium of the European Association for Research in Transportation
Period: 12 Sep 2017 → 14 Sep 2017
Mads Paulsen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event

hEART 2017: 6th Symposium of the European Association for Research in Transportation
12/09/2017 → 14/09/2017
Haifa, Israel
Activity: Attending an event › Participating in or organising a conference

**Passenger arrival and waiting time distributions dependent on train service frequency and station characteristics: A smart card data analysis in Copenhagen**
Period: 12 Sep 2017 → 14 Sep 2017
Jesper Bláfoss Ingvarsson (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

**Related event**
**hEART 2017: 6th Symposium of the European Association for Research in Transportation**
12/09/2017 → 14/09/2017
Haifa, Israel
Activity: Talks and presentations › Conference presentations

**Prediction Model Adaptation in Response to Traffic Disruptions**
Period: 12 Sep 2017 → 14 Sep 2017
Inon Peled (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling

**Description**
Presented my research about quick adaptation of traffic prediction model per incident parameters.
Degree of recognition: International
Documents:
heart_abstract

**Related event**
**hEART 2017: 6th Symposium of the European Association for Research in Transportation**
12/09/2017 → 14/09/2017
Haifa, Israel
Activity: Talks and presentations › Conference presentations

**MATSim User Meeting: Special Session @ hEART 2017**
Period: 11 Sep 2017
Mads Paulsen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling

**Description**
User meeting on the latest development of MATSim from users around the world.
Degree of recognition: International

**Related event**
**MATSim User Meeting: Special Session @ hEART 2017**
11/09/2017 → 11/09/2017
Haifa, Israel
Activity: Attending an event › Participating in or organising a conference
Stowage planning: A benchmark and a novel heuristic
Period: 6 Sep 2017
Rune Larsen (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
International Conference on Operations Research 2017
06/09/2017 → 08/11/2017
Berlin, Germany
Activity: Talks and presentations › Conference presentations

Austrian Science Fund / Der Wissenschaftsfonds (External organisation)
Period: Aug 2017 → Oct 2017
Per Dannemand Andersen (Chairman)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Description
Review of research application

Related external organisation
Austrian Science Fund / Der Wissenschaftsfonds
Wien, Austria
Activity: Membership › Membership in review committee

Joint Modelling of Schedule- and Frequency-based Services in Public Transport Assignment Models
Period: 29 Aug 2017
Morten Eltved (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Documents:
Trafikdage_Presentation_Joint Modelling of Schedule- and Frequency-based Services in Public Transport Assignment Models

Related event
Trafikdage 2017
28/08/2017 → 29/08/2017
Aalborg, Denmark
Activity: Talks and presentations › Conference presentations

Mobilitetspotentiale for Aarhus Letbane
Period: 29 Aug 2017
Michael Bruhn Barfod (Guest lecturer)
Department of Management Engineering
Management Science
Cyklistuheld – hvilken betydning har vejen, køretøjet og trafikanten
Period: 28 Aug 2017 → 29 Aug 2017
Kira Hyldekær Janstrup (Speaker)
Mette Møller (Other)
Ninette Pilegaard (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Technology and Innovation Management
Systems Analysis

Preliminary results from the project "Slow On the Bottle – Enjoy the Road (SOBER)": Instruments to measure implicit associations towards drunkdriving and to change implicit drunk-driving associations
Period: 28 Aug 2017
Laila Marianne Martinussen (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Degree of recognition: International
Documents:
62_LailaMartinussen

The influence of transit service frequency and station characteristics on passenger arrival time distributions: A smart card data analysis in the Greater Copenhagen Area
Period: 28 Aug 2017 → 29 Aug 2017
Jesper Bláfoss Ingvardson (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Comparison Between Young Male Drivers' Self-assessed and Objectively Measured Driving Skills
Period: 21 Jul 2017
Laila Marianne Martinussen (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Description
Self-assessment of skills is a self-generated feedback process that contributes to confidence in one's skills. The higher one's self-assessed skills, the more likely one is to feel competent a particular domain thereby influencing the related behaviors. Drivers' self-assessed driving skills are not always accurate, which may cause serious problems such as underestimation of risk, reckless driving and accidents. Most previous research on self-assessment of driving skills did not compare self-reported skills to objectively measured driving skills, so the aim of this study was to test the accuracy of young male drivers' self-assessments of driving skills using a driving simulator, and to examine whether self-assessment accuracy varied with driving skill, experience or sensation-seeking propensity. Results showed that the drivers' self-assessments were inconsistent with their driving performance, and this inconsistency varied with driving skill, driving experience and sensation-seeking propensity in a safety-critical way.

Related event
AHFE: International Conference on Applied Human Factors and Ergonomics
17/07/2017 → 21/07/2017
Los Angeles, California, United States
Activity: Talks and presentations › Conference presentations

Novice Drivers' Objective and Subjective Hazard Detection Skills: Potentially Hazardous Pedestrian Events in Typical Car-Pedestrian Accident Locations in Denmark
Period: 21 Jul 2017
Liva Abele (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Degree of recognition: International

Related event
AHFE: International Conference on Applied Human Factors and Ergonomics
17/07/2017 → 21/07/2017
Los Angeles, California, United States
Activity: Talks and presentations › Conference presentations

Tramp ship routing and scheduling with voyage separation requirements
Period: 17 Jul 2017
Jesper Larsen (Guest lecturer)
Charlotte Vilhelmsen (Other)
Richard Martin Lusby (Other)
This presentation addresses a tramp routing and scheduling problem. Tramp ships operate like taxies by following the available demand, as opposed to liner ships that operate like busses on a fixed route network according to a published timetable. Tramp operators determine some of the demand in advance by ensuring long-term contracts. The rest of the demand comes from optional voyages found in the spot market. Routing and scheduling a tramp feet to best utilize feet capacity according to the current demand is therefore an ongoing and complicated problem. We add further complexity by incorporating voyage separation requirements that enforce a minimum time spread between some voyages. We developed a new and exact Branch-and-Price procedure for this problem. A dynamic programming algorithm generates columns, while a novel time window branching scheme is used to enforce the voyage separation requirements. Computational results show that the algorithm finds optimal solutions very quickly for the vast majority of test instances. We compare the results with two earlier published methods and show that our Branch-and-Price approach outperforms both an a priori path generation method and an Adaptive Large Neighbourhood Search heuristic.

Related event

**IFORS 2017: 21st Conference of the International Federation of Operations and Research**
17/07/2017 → 21/07/2017
Québec City, Canada
Activity: Talks and presentations › Conference presentations

**Integrating environmental impacts into cost-benefit analysis - The value of environmental pollutants**
Period: 26 Jun 2017
Yan Dong (Speaker)
Stefano Manzo (Other)
Michael Zwicky Hauschild (Other)
Department of Management Engineering
Quantitative Sustainability Assessment
Transport DTU
Transport Modelling
Degree of recognition: International
Documents:
Abstract_Final version
Links:
http://programme.exordo.com/isie2017/delegates/presentation/13/

Related event

**9th biennial conference of the International Society for Industrial Ecology (ISIE) and the 25th annual conference of the International Symposium on Sustainable Systems and Technology (ISSSST)**
25/06/2017 → 29/06/2017
Chicago, United States
Activity: Talks and presentations › Conference presentations

**Integrating environmental impacts into cost-benefit analysis - The value of environmental pollutants**
Period: 25 Jun 2017 → 29 Jun 2017
Yan Dong (Guest lecturer)
Stefano Manzo (Guest lecturer)
Michael Zwicky Hauschild (Guest lecturer)
Department of Management Engineering
Quantitative Sustainability Assessment
Sustainable Development Goals (SDGs) have raised the attention of the global society to apply environmental friendly solutions to solve problems. Cost Benefit Analysis (CBA) has been broadly used in different contexts and disciplines to facilitate decision makers in choosing among alternatives. CBA assumes that for each alternative there is a set of consequences, divided between costs and benefits that can be expressed in monetary terms. The preferred alternative is the one with the higher benefit cost ratio or Net Present Value (NPV). The considered consequences vary depending on the decision context. For example, the consequences that are covered in conventional transport projects include, among others, financial costs, travel time savings, variation in distance traveled, and the so called externalities, including number of accidents, noise impacts and some air pollutants (e.g. CO2, NOx, SOx, CO and HC from fuel consumption). With respect to the air pollutants, monetary values are provided by CBA guidelines for transport as well as for other disciplines. However, CBA overlooks the full life cycle of infrastructures and vehicles, and the full set of environmental impacts, due to the lack of methodology to quantify the comprehensive impacts and the lack of monetary values of those impacts. Life Cycle Assessment (LCA) is a robust methodology that assesses environmental profiles of products and services through their whole life cycles. For a given solution to a decision problem, LCA can quantify environmental pollutants and resource consumptions that are associated with the physical elements in the solution (e.g. infrastructures and vehicles). Note that LCA provides an inventory that covers a comprehensive list of pollutants and resource consumptions, which can also be translated into damages on the protected area, namely ecosystem health, human health and resources availability, via life cycle impact assessment (LCIA). This gives possibilities of monetizing environmental impacts either on the inventory level, or on the damage level. Nevertheless, the monetizing values of different pollutants and resources should be consistent with the damages (and thus the monetizing values of the damages) that they may cause on the protected area.

This research aims to 1) investigate the monetary values of environmental pollutants in the chosen application disciplines; 2) understand if those values are consistent with the monetized damages calculated by LCA methods and; 3) compare CBA with and without LCA, considering the uncertainty, using a transport case study. Our study shows that the monetized damages calculated by LCA methods lie within the range of values reviewed in transport and waste treatment studies. The variation of pollutant prices can vary up to 2-3 orders of magnitude depending on the chosen methodology. The results from the transport case study show that including the monetized LCA result in the traditional CBA doubles the NPV. This suggests that the price assigned to particularly CO2 can change the NPV dramatically, which can influence the decision when more options are available. In sum, integrating monetized LCA results into current CBA is a feasible way of including environmental impacts in decision making, increasing the environmental relevance of the decision support.

Degree of recognition: International

Links:
http://isie-issst2017.uic.edu/

Related event

ISIE 2017: Science for Sustainable and Resilient Communities
25/06/2017 → 29/06/2017
Chicago, United States
Activity: Talks and presentations › Conference presentations

MADE Danish Manufacturing Association Conference
Period: 15 Jun 2017
Daniel Alberto Sepúlveda Estay (Speaker)
Department of Management Engineering
Management Science
Operations Management
Transport DTU

Description
Supply Chain Cyber resilience - The New Normal

Documents:
170515b_MADE_Final

Related event

MADE Danish Manufacturing Association Conference
Samfundsekonominiske konsekvenser af trafiksikkerhed
Period: 14 Jun 2017
Kira Hyldekaer Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related external organisation
Brancheforeningen Sikre Veje
Lautrupvej 2, 2750, Ballerup, Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

Trafiksikkerhed som grundlag for bedre prioritering af vejvedligehold
Period: 12 Jun 2017 → 13 Jun 2017
Kira Hyldekaer Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
NVF - Vejteknologisk sommermøde
12/06/2017 → 13/06/2017
Stockholm, Sweden
Activity: Talks and presentations › Conference presentations

Ambitiøse mål for trafiksikkerhed
Period: 31 May 2017
Kira Hyldekaer Janstrup (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
Transport Summer Summit DTU 2017: Challenges, research and new developments within transportation, mobility and sustainability
31/05/2017 → 31/05/2017
Lyngby, Denmark
Activity: Talks and presentations › Conference presentations

Creating Ideal Railway Traffic in a Multi-Modal Simulation Universe
Period: 31 May 2017
Mads Paulsen (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
Pecha Kucha presentation in the railway pitch session.
Understanding railway delays
Period: 31 May 2017
Fabrizio Cerreto (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
Description of research results from the PhD project in IPTOP at DTU
Degree of recognition: Local
Links:
http://www.tilmeld.dk/summersummit2017/ (Conference homepage)

Related event
Transport Summer Summit DTU 2017: Challenges, research and new developments within transportation, mobility and sustainability
31/05/2017 → 31/05/2017
Lyngby, Denmark
Activity: Talks and presentations › Conference presentations

Big Data Analysis in Railway Delays
Period: 15 May 2017
Fabrizio Cerreto (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
Results from PhD research on railway delays using data analysis at DTU
Degree of recognition: National
Documents:
BIG DATA ANALYSIS IN RAILWAY DELAYS - Fabrizio Cerreto
Links:
http://www.banekonference.dk/en (Conference homepage)
http://www.banekonference.dk/sites/default/files/slides/12/1530_merged.pdf (Presentation slides on the conference homepage)
http://www.banekonference.dk/en/program/2017 (Conference program)

Related event
Danish Rail Conference 2017
15/05/2017 → ...
Copenhagen, Denmark
Activity: Talks and presentations › Conference presentations
Applying LCA in decision making - the need and the future perspective
Period: 10 May 2017
Yan Dong (Speaker)
Simona Miraglia (Other)
Stefano Manzo (Other)
Stylianos Georgiadis (Other)
Hjalte Jomo Danielsen Sørup (Other)
Elena Boriani (Other)
Tine Hald (Other)
Sebastian Thöns (Other)
Michael Zwicky Hauschild (Other)
Department of Management Engineering
Quantitative Sustainability Assessment
Centre for oil and gas – DTU
Transport DTU
Transport Modelling
Department of Applied Mathematics and Computer Science
Statistics and Data Analysis
Department of Environmental Engineering
Urban Water Systems
National Food Institute
Research Group for Genomic Epidemiology
Department of Civil Engineering
Section for Structural Engineering
Documents:
AbstraApplying LCA in policy decision making_Final
Links:
https://brussels.setac.org/welcome/

Related event
SETAC Europe: 27th Annual Meeting – Environmental Quality Through Transdisciplinary Collaboration
07/05/2017 → 13/07/2017
Brussels, Belgium
Activity: Talks and presentations › Conference presentations

Young drivers' hazard detection
Period: 9 May 2017 → 10 May 2017
Liva Abele (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Degree of recognition: International

Related event
The 6th Annual Scientific Seminar of the Nordic Traffic Safety Academy
09/05/2017 → …
Copenhagen, Denmark
Activity: Talks and presentations › Conference presentations
Applying LCA in decision making - the need and the future perspective

Period: 7 May 2017 → 11 May 2017

Yan Dong (Guest lecturer)
Simona Miraglia (Guest lecturer)
Stefano Manzo (Guest lecturer)
Stylianos Georgiadis (Guest lecturer)
Hjalte Jomo Danielsen Sarup (Guest lecturer)
Elena Boriani (Guest lecturer)
Tine Hald (Guest lecturer)
Sebastian Thöns (Guest lecturer)
Michael Zwicky Hauschild (Guest lecturer)

Department of Management Engineering
Quantitative Sustainability Assessment

Department of Civil Engineering
Transport DTU
Transport Modelling

Department of Applied Mathematics and Computer Science
Statistics and Data Analysis

Department of Environmental Engineering
Urban Water Systems
National Food Institute
Research Group for Genomic Epidemiology
Section for Structural Engineering

Description
There is nowadays a need of including sustainable considerations in the policy and decision making. Sound decision making requires evidence-based support, i.e. decision analysis to help decision makers in identifying the best alternative based on the associated impacts. Decision analysis includes four steps: 1) structure decision problem; 2) assess possible impacts associated with alternatives; 3) determine stakeholder preferences and 4) evaluate alternatives. Decision analysis can be performed applying different tools, such as cost-benefit analysis (CBA), risk assessment, and life cycle assessment (LCA).

LCA is a decision analysis tool that focuses on environmental impacts. One limit is that LCA is based on defined impact categories and therefore does not provide information for those impacts and consequences out of the LCA scope. However, the LCA framework closely follows the decision analysis scheme and has the potential to be integrated with other decision analysis tools to enhance their assessment of environmental impacts.

To understand why LCA is needed in the policy decision context, we looked into the decision support for policy in several disciplines. Taking sustainable transport policy as an example, the traditional decision analysis tool for choosing the best alternative is CBA. CBA mainly analyses socio-economic impacts, such as travel time savings and costs, while only some environmental impacts are considered; i.e. the damage costs of greenhouse gas emissions, particulate matters, SOx, NOx and noise. Therefore, current transport policy making rarely reflect a full environmental profile of the suggested alternatives. Making decisions based on incomplete information may lead to sub-optimal solutions, especially where the environment is a major concern. There is a growing attention of conducting LCA in transport. Some identified environmental hotspots, such as consumer and household behavior, which may be the focus for future policies. Others assess the environmental impacts associated with building infrastructures and vehicle use. These studies verify that LCA can successfully quantify the environmental profile of alternatives in transport policy, if the relevant physical changes, e.g. vehicle travel distance and new infrastructures, are well-defined. However, before integrating LCA with other decision analysis methods for decision support, the study system, objectives, scopes, evaluation metrics and uncertainty handling need to be aligned.

Degree of recognition: International

Links:
https://brussels.setac.org/

Related event

SETAC Europe: 27th Annual Meeting – Environmental Quality Through Transdisciplinary Collaboration
07/05/2017 → 13/07/2017
Brussels, Belgium
Activity: Talks and presentations › Conference presentations

**Aarhus University (External organisation)**
Period: 27 Apr 2017
Per Dannemand Andersen (Chairman)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

**Description**
Member of the assessment committee of the PhD thesis of Tymen Jissink. Department of Management, School of Business and Social Sciences, Aarhus University, Denmark.

**Related external organisation**

**Aarhus University**
Inge Lehmanns Gade 10, 8000, Aarhus C, Denmark
Activity: Membership › Membership in review committee

**Exposure group meeting - Walk21**
Period: 18 Apr 2017
Kira Hyldekaer Janstrup (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

**Related event**

**OECD - International Transport Forum: IRTAD - Meeting**
18/04/2017 → 20/04/2017
Paris, France
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

**Integrating Life-cycle Assessment into Transport Cost-benefit Analysis**
Period: 18 Apr 2017 → 21 Apr 2017
Stefano Manzo (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

**Related external organisation**

**Transport Research Arena**
Activity: Talks and presentations › Conference presentations

**Teaching Assistant for course 15.872 System Dynamics II**
Period: 15 Apr 2017 → 2 Jun 2017
Daniel Alberto Sepúlveda Estay (Guest lecturer)
Bradley Morrison (Lecturer)
Department of Management Engineering
Management Science
Description
15.871 and 872 introduce you to system dynamics modeling for the analysis of business policy and strategy. You will learn to visualize a business organization in terms of the structures and policies that create dynamics and regulate performance. System dynamics allows us to create ‘microworlds,’ management flight simulators where space and time can be compressed, slowed, and stopped so we can experience the long-term side effects of decisions, systematically explore new strategies, and develop our understanding of complex systems. In these system dynamics courses we use simulation models, case studies, and management flight simulators to develop principles of policy design for successful management of complex strategies. Case studies of successful strategy design and implementation using system dynamics will be stressed. We consider the use of systems thinking to promote effective organizational learning. The principal purpose of modeling is to improve our understanding of the ways in which an organization’s performance is related to its internal structure and operating policies as well as those of customers, competitors, suppliers, and other stakeholders.

During the course students use several simulation models to explore such strategic issues as fluctuating sales, production and earnings; market growth and stagnation; the diffusion of new technologies; the use and reliability of forecasts; the rationality of business decision making; and applications in health care, energy policy, environmental sustainability, and other topics.

Students learn to recognize and deal with situations where policy interventions are likely to be delayed, diluted, or defeated by unanticipated reactions and side effects. You will have a chance to use state of the art software for computer simulation and gaming. Assignments give hands-on experience in developing and testing computer simulation models in diverse settings.

Degree of recognition: National

Documents:
Syllabus for course 15.872 System Dynamics II

Related event

15.872 System Dynamics II
15/04/2017 → 02/06/2017
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

Sammenhængen mellem vejenes tilstand, ulykker og samfundsøkonomi
Period: 30 Mar 2017
Kira Hyldekær Janstrup (Invited speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related external organisation

Asfaltindustrien
Lautrupvej 2, 2750, Ballerup, Denmark
Activity: Talks and presentations › Talks and presentations in private or public companies and organisations

2017 STAMP Workshop
Period: 27 Mar 2017 → 30 Mar 2017
Daniel Alberto Sepúlveda Estay (Speaker)
Nancy Leveson (Speaker)
John Thomas (Lecturer)
Department of Management Engineering
Management Science
Transport DTU

Description
MIT STAMP/STPA Workshop took place during March 27-30, 2017.

STAMP is an accident causality model based on systems theory and systems thinking. STAMP integrates into engineering
analysis the causal factors in our increasingly complex systems such as software, human-decision making and human factors, new technology, social and organizational design, and safety culture.

STPA is a powerful new hazard analysis technique based on STAMP while CAST is the equivalent for accident/incident analysis. These tools are now used globally in almost every industry. Newer tools, such of those for doing early concept analysis (STECA) security analysis (STPA-Sec) and leading indicators have been developed. This free workshop will provide attendees with the opportunity to learn how to use these new tools, to meet with users and to hear about applications, evaluations, and the latest developments in this powerful new approach to system safety engineering and to cyber security.

Degree of recognition: International
Documents:
170330_Workshop_presentation_Sepulveda

Related external organisation

Massachusetts Institute of Technology
Cambridge, United States
Activity: Talks and presentations › Conference presentations

Low Carbon, Smart and Sustainable Cities Workshop
Period: 20 Mar 2017
Subash Dhar (Organizer)
Department of Management Engineering
Transport DTU
UNEP DTU Partnership

Description
Smart Cities in India and the international policy context
Degree of recognition: National
Documents:
Subash Dhar SMART CITIES PPT 2017 Final

Related event

Low Carbon, Smart and Sustainable Cities Workshop
20/03/2017 → 20/03/2017
Delhi, India
Activity: Attending an event › Participating in or organising a conference

Webinar: Recovery of Operations from Cyberattacks - a structure for response
Period: 15 Mar 2017
Daniel Alberto Sepúlveda Estay (Speaker)
Department of Management Engineering
Management Science
Transport DTU

Description
Cyber attacks on supply chains are a constant threat to organizations. News media are regularly reporting cyber attacks to supply chains that result in data theft or denial of service. Examples abound, such as the theft of credit card data for 70 million customers from Target in 2013, and a sophisticated distributed attack that blocked the websites of major companies in the east-US such as Amazon, Starbucks and PayPal, during most the 21st of October 2016. Although relevant, this coverage often overshadows cyber-attacks that affect supply chain operations, which continue to occur without media attention. This is giving hackers free range to refine and practice their techniques for increased penetration and damage, resulting in a whole different range of disruptions such as container theft, intervention of plant operation, or misallocation of payments, for example. The MIT Center for Transportation & Logistics (CTL) will host a webinar to address hacker-related vulnerabilities in supply chain operations. At the root of this problem lies the structure of data exchanges between supply chain partners. Key questions for supply chain managers include: How does your supply chain manage these data exchanges? How much are you assigning these problems to IT even though they have direct impact on operations? How does your supply chain prevent these attacks, or react when these attacks happen? Is your supply chain merely relying on external insurance, or do you understand how these exchanges can be designed and controlled in
cases of attack for improved recovery? Dr. Jim Rice and Daniel Sepulveda, PhD student, will address these questions, and talk about research findings that offer a deeper understanding of the structures that supply chains can use to improve their response from hacker attacks so as to minimize operational disruption and allow a more efficient recovery.

Chairman: James Blanley Rice. Center for Transportation and Logistics at the Massachusetts Institute of Technology

Degree of recognition: International

Documents:
170315_Webinar_Daniel_Sepulveda
MIT-CTL-Webinar_registration_page

Links:
https://www.youtube.com/watch?v=zsmipjNRcfl (Cyber attacks on supply chains are a constant threat to organizations. News media are regularly reporting cyber attacks to supply chains that result in data theft or denial of service. Examples abound, such as the theft of credit card data for 70 million customers from Target in 2013, and a sophisticated distributed attack that blocked the websites of major companies in the east-US such as Amazon, Starbucks and PayPal, during most the 21st of October 2016. Although relevant, this coverage often overshadows cyber-attacks that affect supply chain operations, which continue to occur without media attention. This is giving hackers free range to refine and practice their techniques for increased penetration and damage, resulting in a whole different range of disruptions such as container theft, intervention of plant operation, or misallocation of payments, for example. The MIT Center for Transportation & Logistics (CTL) will host a webinar to address hacker-related vulnerabilities in supply chain operations. At the root of this problem lies the structure of data exchanges between supply chain partners. Key questions for supply chain managers include: How does your supply chain manage these data exchanges? How much are you assigning these problems to IT even though they have direct impact on operations? How does your supply chain prevent these attacks, or react when these attacks happen? Is your supply chain merely relying on external insurance, or do you understand how these exchanges can be designed and controlled in cases of attack for improved recovery? Dr. Jim Rice and Daniel Sepulveda, PhD student, will address these questions, and talk about research findings that offer a deeper understanding of the structures that supply chains can use to improve their response from hacker attacks so as to minimize operational disruption and allow a more efficient recovery.)

Related event

Webinar: Recovery of Operations from Cyberattacks - a structure for response
15/03/2017 → …
Cambridge, United States
Activity: Talks and presentations › Conference presentations

Mining historical delay data in railways
Period: 22 Feb 2017
Fabrizio Cerreto (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling

Description
Operating delays and network propagation are inherent characteristics of railway operations. Train detection systems collect large amounts of data in operation every day and recurring delay patterns can be spotted to improve the timetable design against delay propagation.

We propose multivariate statistic and computational data analysis tools to analyze railway delays from historical records. The trains paths are partitioned through different clustering methods to spot typical delay patterns, following the spatial profiles of absolute delays and changes in delay. The relations between the delay of the clusters and impacting factors, such as rolling stock compositions, time of the day, and of the year, are investigated and reported.

Data from Danish Railway is analyzed, and criticalities in data collection are highlighted. The tools presented can easily be transferred to other countries and other means of transport with sufficient data granularity.

Understanding the delay development and propagation on railway lines allows an improved allocation of time supplements, and results in smaller overall aggregate timetable supplement, reduced transport travel times, and higher productive utilization of train rolling stock. The study results will lead eventually to both better allocation of time supplements in timetable structures, and identification of areas that should be a high priority for correction.

Degree of recognition: International

Documents:
Mining historical delay data in railways - Presentation
Links:
https://for2083.math.uni-goettingen.de/en/project (FOR 2083 Project Description)
https://for2083.math.uni-goettingen.de/en/events/iptop (Event webpage)

**Related event**

**FOR 2083 meets IPTOP**  
20/02/2017 → 22/02/2017  
Stuttgart, Germany  
Activity: Talks and presentations › Conference presentations

**City Logistics – constraints and opportunities. E-mobility and city logistics – for citizens, goods and business**  
Period: 2 Feb 2017  
Allan Larsen (Guest lecturer)  
Department of Management Engineering  
Management Science  
Transport DTU  
Operations Management  
Degree of recognition: National

**Related event**

**E-MOBILITY & CITY LOGISTICS - for citizens, goods, and business: Region Hovedstaden seminar om E-mobility**  
02/02/2017 → …  
København, Denmark  
Activity: Talks and presentations › Conference presentations

**The commuting habit loop: The role of satisfying existence, relatedness, and growth needs in modal choice**  
Period: 10 Jan 2017  
Jesper Bláfoss Ingvardson (Guest lecturer)  
Department of Management Engineering  
Transport DTU  
Transport Modelling  
Degree of recognition: International

**Related event**

**TRB 2017: 96th Annual Meeting of the Transportation Research Board**  
08/01/2017 → 12/01/2017  
Washington D.C., United States  
Activity: Talks and presentations › Conference presentations

**Subcommity of ABJ10 Long Distance and Intercity Travel Joint Subcommity**  
Period: 9 Jan 2017  
Linda Christensen (Guest lecturer)  
Transport DTU  
Transport Modelling  
Degree of recognition: International  
Documents:  
Long distance travel TRB subcommity - supplemented

**Related external organisation**

**Transportation Research Board, TRB**  
United States  
Activity: Talks and presentations › Conference presentations
Teaching Assistant for course 15.871 Introduction to System Dynamics
Period: 7 Jan 2017 → 15 Apr 2017
Daniel Alberto Sepúlveda Estay (Participant)
Department of Management Engineering
Management Science
Transport DTU

Description
15.871 and 872 introduce you to system dynamics modeling for the analysis of business policy and strategy. You will learn to visualize a business organization in terms of the structures and policies that create dynamics and regulate performance. System dynamics allows us to create ‘microworlds,’ management flight simulators where space and time can be compressed, slowed, and stopped so we can experience the long-term side effects of decisions, systematically explore new strategies, and develop our understanding of complex systems. In these system dynamics courses we use simulation models, case studies, and management flight simulators to develop principles of policy design for successful management of complex strategies. Case studies of successful strategy design and implementation using system dynamics will be stressed. We consider the use of systems thinking to promote effective organizational learning.

The principal purpose of modeling is to improve our understanding of the ways in which an organization’s performance is related to its internal structure and operating policies as well as those of customers, competitors, suppliers, and other stakeholders.

During the course students use several simulation models to explore such strategic issues as fluctuating sales, production and earnings; market growth and stagnation; the diffusion of new technologies; the use and reliability of forecasts; the rationality of business decision making; and applications in health care, energy policy, environmental sustainability, and other topics.

Students learn to recognize and deal with situations where policy interventions are likely to be delayed, diluted, or defeated by unanticipated reactions and side effects. You will have a chance to use state of the art software for computer simulation and gaming. Assignments give hands-on experience in developing and testing computer simulation models in diverse settings.

Degree of recognition: National
Documents:
Syllabus for course 15.871 Introduction to System Dynamics
Activity: Other
Students learn to recognize and deal with situations where policy interventions are likely to be delayed, diluted, or defeated by unanticipated reactions and side effects. You will have a chance to use state of the art software for computer simulation and gaming. Assignments give hands-on experience in developing and testing computer simulation models in diverse settings.

Degree of recognition: National
Documents:
Syllabus for course 15.871 Introduction to System Dynamics

Related external organisation
Massachusetts Institute of Technology
Cambridge, United States
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

Assessment committee PhD student Kira Janstrup (External organisation)
Period: 2016
Mette Møller (Chairman)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Related external organisation
Assessment committee PhD student Kira Janstrup
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

Behavioral Science (Journal)
Period: 2016 → …
Mette Møller (Reviewer)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Related journal
Behavioral Science
Local database
Activity: Research › Peer review of manuscripts

Cyklistssikkerhed
Period: 2016
Mette Møller (Organizer)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Description
Sessionsleder

Related event
Cyklistssikkerhed
23/08/2016 → 23/08/2016
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.
European Journal of Transport and Infrastructure Research (Journal)
Period: 2016 → …
Mette Møller (Reviewer)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Related journal
European Journal of Transport and Infrastructure Research
Local database
Activity: Research › Peer review of manuscripts

International Journal of Drug Policy (Journal)
Period: 2016 → …
Mette Møller (Reviewer)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Related journal
International Journal of Drug Policy
Local database
Activity: Research › Peer review of manuscripts

International Journal of Sustainable Transportation (Journal)
Period: 2016 → …
Mette Møller (Reviewer)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Related journal
International Journal of Sustainable Transportation
1556-8318
Central database
Activity: Research › Peer review of manuscripts

Passageradfærd og sikkerhed på jernbanen
Period: 2016
Mette Møller (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Related event
Passageradfærd og sikkerhed på jernbanen
03/11/2016 → 03/11/2016
Activity: Talks and presentations › Conference presentations
Program committee RSS17 Road Safety & Simulation international conference (External organisation)
Period: 2016 → 2017
Mette Møller (Participant)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Related external organisation

Program committee RSS17 Road Safety & Simulation international conference
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

Program committee Trafikdage (External organisation)
Period: 2016 → 2018
Mette Møller (Participant)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Related external organisation

Program committee Trafikdage
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

RSS17 Roads Safety & Simulation international conference (Journal)
Period: 2016 → 2017
Mette Møller (Reviewer)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Related journal

RSS17 Roads Safety & Simulation international conference
Local database
Activity: Research › Peer review of manuscripts

Safety (Journal)
Period: 2016 → …
Mette Møller (Reviewer)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Related journal

Safety
Local database
Activity: Research › Peer review of manuscripts

Period: 2016 → …
Mette Møller (Reviewer)  
Department of Management Engineering  
Technology and Innovation Management  
Transport DTU  

**Related journal**  
Local database  
Activity: Research › Peer review of manuscripts

**TrygFondens Unge-forskningsnetværk (External organisation)**  
Period: 2016 → 2018  
Mette Møller (Participant)  
Department of Management Engineering  
Technology and Innovation Management  
Transport DTU  

**Related external organisation**  
TrygFondens Unge-forskningsnetværk  
Activity: Membership › Membership of research networks or expert groups

**Young Researchers Seminar 2017 (Event)**  
Period: 2016 → 2017  
Mette Møller (Member)  
Department of Management Engineering  
Technology and Innovation Management  
Transport DTU  
Degree of recognition: International  

**Related event**  
Young Researchers Seminar 2017  
16/05/2017 → 18/05/2017  
Berlin, Germany  
Activity: Membership › Membership in review committee

**30th Annual Conference on Neural Information Processing Systems**  
Period: 5 Dec 2016 → 10 Dec 2016  
Filipe Rodrigues (Participant)  
Department of Management Engineering  
Transport DTU  
Transport Modelling  
Degree of recognition: International  

**Related event**  
30th Annual Conference on Neural Information Processing Systems  
05/12/2016 → 10/12/2016  
Barcelona, Spain  
Activity: Attending an event › Participating in or organising a conference
Modelling production-consumption flows of goods in Europe: the trade model within Transtools 3

Period: 5 Oct 2016
Gerard de Jong (Speaker)
Reto Tanner (Other)
Jeppe Rich (Other)
Mikkel Thorhauge (Other)
Otto Anker Nielsen (Other)
John Bates (Other)

Department of Management Engineering
Transport DTU
Transport Modelling

**Description**

Estimation results and elasticities are presented for the trade model within the European transport model Transtools3. We also explain how the outcomes of this model are used in the overall freight model.

Degree of recognition: International

Documents:
Trademodel TT3 ETC_2016_v1

**Related event**

European Transport Conference 2016
05/10/2016 → 05/10/2016
Barcelona, Spain
Activity: Talks and presentations › Conference presentations

**Bus and Passenger Simulation within a Combined Agent-Based Multi-Modal Assignment Model**

Period: 16 Sep 2016
Mads Paulsen (Speaker)
Thomas Kjær Rasmussen (Other)
Otto Anker Nielsen (Guest lecturer)

Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

**Related event**

HEART 2016: 5th Symposium of the European Association for Research in Transportation
14/09/2016 → 16/09/2016
Delft, Netherlands
Activity: Talks and presentations › Conference presentations

**A model for freight transport chain choice in Europe**

Period: 14 Sep 2016 → 16 Sep 2016
Anders Fjendbo Jensen (Speaker)
Mikkel Thorhauge (Other)
Gerard de Jong (Speaker)
Jeppe Rich (Other)
Thijs Dekker (Other)
Daniel Johnson (Other)
Manuel Ojeda Cabral (Other)
John Bates (Other)
Otto Anker Nielsen (Other)

Department of Management Engineering
Description
This paper describes the structure of the Transtools3 freight transport chain choice model for Europe and the data at the shipment level that were used in estimation, and presents the estimation results and resulting elasticities. It also discusses the structure of the overall freight model and how production-consumption matrices from a trade model are combined with the transport chain choice model in model application. In the estimation of the transport chain choice model on the available disaggregate data sources (the Swedish Commodity Flow Survey 2009 and the French ECHO survey) we tested several options for the specification of transport costs in the model and various nesting structures.

Related event

heart 2016
14/09/2016 → 16/09/2016
Delft, Netherlands
Activity: Talks and presentations › Conference presentations

Evaluation of satisfaction and knowledge propagation in public transport
Period: 14 Sep 2016
Jesper Bláfoss Ingvardson (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event

hEART 2016: 5th Symposium of the European Association for Research in Transportation
14/09/2016 → 16/09/2016
Delft, Netherlands
Activity: Talks and presentations › Conference presentations

Synthesis of household based trip diaries
Period: 14 Sep 2016
Mikkel Thorhauge (Speaker)
Jeppe Rich (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Documents:
Thorhauge - Trafikdage 2016 - Synthetic HH

Related event

heart 2016
14/09/2016 → 16/09/2016
Delft, Netherlands
Activity: Talks and presentations › Conference presentations

The commuting habit loop: The role of satisfying existence, relatedness and growth needs in modal choice
Period: 14 Sep 2016
Jesper Bláfoss Ingvardson (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event

hEART 2016: 5th Symposium of the European Association for Research in Transportation
14/09/2016 → 16/09/2016
Delft, Netherlands
Activity: Talks and presentations › Conference presentations

Workshop on Public Transport Modelling and Analytics
Period: 13 Sep 2016
Mads Paulsen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event

Workshop on Public Transport Modelling and Analytics
13/09/2016 → 13/09/2016
Delft, Netherlands
Activity: Attending an event › Participating in or organising a conference

Udvikling af transportvanedata for husholdninger
Period: 23 Aug 2016
Mikkel Thorhauge (Speaker)
Jeppe Rich (Other)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: National
Documents:
Thorhauge - Trafikdage 2016 - Synthetic HH

Related event

Trafikdage 2016
22/08/2016 → 23/08/2016
Ålborg, Denmark
Activity: Talks and presentations › Conference presentations

Litteraturstudie af effekterne af BRT, letbaner og metro
Period: 22 Aug 2016
Jesper Bláfoss Ingvarsson (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: National

Related event

Trafikdage 2016
22/08/2016 → 23/08/2016
Ålborg, Denmark
Selvkørende biler trafikantadfærd
Period: 22 Aug 2016
Mette Møller (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Description
Selvkørende biler

Related event
Selvkørende biler trafikantadfærd
22/08/2016 → 22/08/2016
Activity: Talks and presentations › Conference presentations

Effekter af højklasset kollektiv trafik og nærhed til standsningssteder
Period: 9 Jun 2016
Jesper Bláfoss Ingvardson (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: Local

Related event
Movia Trafikbestillerkonference 2016
09/06/2016 → 09/06/2016
Hvidovre, Denmark
Activity: Talks and presentations › Conference presentations

Fast robust solutions to stochastic VRPs using SIMD instructions
Period: 8 Jun 2016
Rune Larsen (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event
Verolog 2016: Annual workshop of the EURO working group on Vehicle Routing and Logistics optimization
06/06/2016 → 08/06/2016
Nantes, France
Activity: Talks and presentations › Conference presentations

Kick Off for Transport DTU
Period: 1 Jun 2016
Mads Paulesen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: National

Related event

Kick Off for Transport DTU
01/06/2016 → 01/06/2016
Kgs. Lyngby, Denmark
Activity: Attending an event › Participating in or organising a conference

Machine Learning for Transportation
Period: 1 Jun 2016 → 3 Jun 2016
Filipe Rodrigues (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event

2016 Summer School on Big Data, Mobility Patterns and Transport Analytics
01/06/2016 → 03/06/2016
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

Transportation Research Part D (Journal)
Period: 2015 → …
Mette Møller (Reviewer)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Related journal

Transportation Research Part D
Local database
Activity: Research › Peer review of manuscripts

4th symposium arranged by European Association for Research in Transportation
Period: 9 Sep 2015 → 11 Sep 2015
Mads Paulsen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event

4th symposium arranged by European Association for Research in Transportation
09/09/2015 → 11/09/2015
Lyngby, Denmark
Activity: Attending an event › Participating in or organising a conference

A meta-study on the significance of rail networks on public transport ridership
Period: 9 Sep 2015
Jesper Bláfoss Ingvardson (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

Related event

**4th symposium arranged by European Association for Research in Transportation**
09/09/2015 → 11/09/2015
Lyngby, Denmark
Activity: Talks and presentations › Conference presentations

**Mesoscopic modelling of on-street public transport**
Period: 22 Jul 2015
Jesper Bláfoss Ingvardson (Guest lecturer)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

活动

**13th Conference on Advanced Systems in Public Transport**
19/07/2015 → 23/07/2015
Rotterdam, Netherlands
Activity: Talks and presentations › Conference presentations

**Stochastic and dynamic city logistics**
Period: 8 Jun 2015
Rune Larsen (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

**Related event**

**VeRoLog 2015: The fourth meeting of the EURO Working Group on Vehicle Routing and Logistics Optimization**
08/06/2015 → 10/06/2015
Vienna, Austria
Activity: Talks and presentations › Conference presentations

**Online Tutorial : Loop Eigenvalue Elasticity Analysis of System Dynamics Models**
Period: 2014 → …
Daniel Alberto Sepúlveda Estay (Participant)
Department of Management Engineering
Management Science
Transport DTU
Operations Management

**Description**

System Dynamics models are composed of different flow and state variables, with multiple interactions. In the process of identifying the relevant structure that leads to the observed behavior, the method of “Loop Eigenvalue Elasticity Analysis” (LEEA) can be very useful in quickly identifying the modes loops most relevant over time for this behavior.

The method was originally proposed by Kampmann and Oliva in 2006. This video is a tutorial that shows the implementation of such method when applied to a specific example.

The video first discusses the theory behind the analysis, then describes step by step the process of data gathering and
processing, to finally describe the analysis of results.

In order to reproduce what is shown in the video, both VENSIM and Mathematica software packages are required.

Degree of recognition: International

Links:
https://www.youtube.com/watch?v=6eGmJKzPFYo (Tutorial about Loop Eigenvalue Elasticity Analysis (LEEA))

Activity: Other

A framework for solving stochastic vehicle routing problems in a dynamic setting using a deterministic solver

Period: 23 Jun 2014
Rune Larsen (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Related event

VeRoLog 2014: The third meeting of the EURO Working Group on Vehicle Routing and Logistics Optimization
22/06/2014 → 25/06/2014
Oslo, Norway
Activity: Talks and presentations › Conference presentations

SafeTREC-UCTC Seminar: Departure time choice modeling

Period: 7 Feb 2014
Mikkel Thorhauge (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling

Description

The focus of this study is departure time choice modeling of car commuters in the morning rush hours. To model this we use the approach first formulated by Small (1982), i.e. the Scheduling Model. This study will contribute to the research of departure time choice modeling in three distinct ways. Firstly, by designing an efficient stated choice design specifically built to capture the trade-offs being made in the choice of departure times. Secondly, to account for detailed level of flexibility not only in relation to the specific trip under question, but for trips and activities throughout a 24 hour time period. This is important because a crucial problem when studying departure time is that the choice of when to realize a given trip is (often) related to the full daily activity pattern, such as a restriction or a preference in one activity may form restrictions in the flexibility of other activities and thereby affects the preference for the related departure time. And thirdly, to incorporate latent variables to measure underlying preferences that potentially affect departure time following the Theory of Planned Behavior, as these preferences are believed to be an important factor in explaining behavior.

Degree of recognition: International

Documents:
Thorhauge_Feb2014

Links:
https://safetrec.berkeley.edu/news/safetrec-uctc-seminar-departure-time-choice-modeling

Related event

SafeTREC-UCTC Seminar: Departure time choice modeling
07/02/2014 → 07/02/2014
Berkeley, United States
Activity: Talks and presentations › Conference presentations

Danish road traffic Accident Invention Board (AIB) (External organisation)
Period: 2013 → …
Mette Møller (Participant)
Department of Management Engineering
related external organisation

Danish road traffic Accident Investigation Board (AIB)
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

Driver style and driver skill – Clustering sub-groups of drivers differing in their potential danger in traffic
Period: 11 Nov 2013 → 12 Nov 2013
Laila Marianne Martinussen (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU

Description
Driver style and driver skill – Clustering sub-groups of drivers differing in their potential danger in traffic
Degree of recognition: International

related event

Strategisk forskning i transport og infrastruktur
11/06/2013 → 12/06/2013
Kongens Lyngby, Denmark
Activity: Talks and presentations › Conference presentations

hEART2013 2nd Symposium of the European Association for Research in Transportation
Period: 4 Sep 2013 → 6 Sep 2013
Mads Paulsen (Participant)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: International

related event

hEART2013 2nd Symposium of the European Association for Research in Transportation
04/09/2013 → 06/09/2013
Stockholm, Sweden
Activity: Attending an event › Participating in or organising a conference

Implicit attitudes towards risky and safe driving in a Danish sample
Period: 4 Jun 2013 → 7 Jun 2013
Laila Marianne Martinussen (Speaker)
Transport DTU

related event

ECTRI/FERSI Young Researchers Seminar
05/06/2013 → 07/06/2013
Lyon, France
Activity: Talks and presentations › Conference presentations
Road Safety on Four Continents
Period: 15 May 2013 → 17 May 2013
Laila Marianne Martinussen (Speaker)
Department of Management Engineering
Technology and Innovation Management
Transport DTU
Department of Transport

Related event
Road Safety on Four Continents
15/05/2013 → 17/05/2013
Beijing, China
Activity: Talks and presentations › Conference presentations

Samfundsøkonomiske fordele i køreplaner ved hjælp af passagerforsinkelsesmodeller
Period: 9 May 2012
Mikkel Thorhauge (Speaker)
Department of Management Engineering
Transport DTU
Transport Modelling
Degree of recognition: National
Documents:
Mikkel_Thorhauge_Banekonferencen_2012

Related event
Danish Railway Conference 2012
09/05/2012 → …
Copenhagen, Denmark
Activity: Talks and presentations › Conference presentations

INFORMS (External organisation)
Period: 1 Oct 2002 → …
Steven Harrod (Participant)
Department of Management Engineering
Management Science
Operations Management
Transport DTU
Degree of recognition: International

Related external organisation
INFORMS
5521 Research Park Drive, Suite 200, MD 21228, Catonsville, United States
Activity: Membership › Membership of research networks or expert groups

Prizes:

DTU’s Young Researcher Award
Kira Hyldekær Janstrup (Recipient)
Department of Management Engineering, Transport DTU, Transport Modelling

Details
Awarded date: 30 Sep 2016
INFORMS Railway Application Section 2016 Student Paper Award - Second Place
Fabrizio Cerreto (Recipient), Otto Anker Nielsen (Recipient) & Steven Harrod (Recipient)
Department of Management Engineering, Transport DTU, Transport Modelling, Management Science

Description
RAS (Railway Applications Section), a subdivision of INFORMS (Institute for Operations Research and Management Sciences), is sponsoring a student research paper contest on analytics and fact-based decision making in railway applications.

Operations Research (OR) and the Management Sciences (MS) are professional disciplines that deal with the application of information technology for informed decision making. OR/MS professionals aim to provide rational bases for decision making by seeking to understand and structure complex situations and to use this understanding to predict system behavior and improve system performance. Much of this work is done using analytical and numerical techniques to develop and manipulate mathematical and computer models of organizational systems composed of people, machines, and procedures. RAS provides a forum for bringing together practitioners, consultants, and academics interested in applying OR/MS techniques to the railroad industry. RAS activities include roundtables, paper sessions at INFORMS national meetings, workshops, and focus groups. Roundtables provide attendees with a unique opportunity to explore, in-depth, topics ranging from eBusiness to simulation to network modeling together with a panel of experts. Paper sessions feature the latest in OR/MS research pertaining to the rail industry.

Details
Awarded date: 13 Nov 2016
Degree of recognition: International
Granting Organisations: INFORMS
event: INFORMS Nashville 2016 Annual Meeting
Prize: Prizes, scholarships, distinctions

Prof. P.H. Bendtsens Transport Research Award
Mikkel Thorhauge (Recipient)
Department of Management Engineering, Transport DTU, Transport Modelling

Details
Awarded date: 22 Aug 2016
Degree of recognition: National
event: Trafikdage 2016
Prize: Prizes, scholarships, distinctions

Third best paper and presentation at ECTRI-FERSI Young Researchers Seminar
Kira Hyldekær Janstrup (Recipient)
Department of Management Engineering, Transport DTU, Transport Modelling

Details
Awarded date: 7 Jun 2013
Granting Organisations: Forum of European Road Safety Institutes ( FERSI)
event: FERSI Young Researchers' Seminar
Prize: Prizes, scholarships, distinctions

Press clippings:

Viser nyt studie virkelig, at kvinder er bedre til at køre bil end mænd?
Laila Marianne Martinussen
30/11/2017
Department of Management Engineering, Technology and Innovation Management, Transport DTU

Media contribution (1)

Viser nyt studie virkelig, at kvinder er bedre til at køre bil end mænd?
30/11/2017
11 veje udstyres med stærkasser
Laila Marianne Martinussen
28/10/2017
Department of Management Engineering, Technology and Innovation Management, Transport DTU

Media contribution (1)

Dårlige veje i Odense kommune kan betyde flere uheld
Kira Hyldekær Janstrup
25/10/2017
Department of Management Engineering, Transport Modelling, Transport DTU

Media contribution (1)

Manipulation af ubevidste holdninger skal bekæmpe spritbilisme
Laila Marianne Martinussen
20/02/2017

Description
Department of Management Engineering, Technology and Innovation Management, Transport DTU

Media contribution (1)

Kejser på P1: Vejrøde
Mette Møller
25/01/2017
Department of Management Engineering, Technology and Innovation Management, Transport DTU

Media contribution (1)