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This issue coincides with 3 publications that are of more than passing interest to the global sustainable transport community. The first is yet another major piece of work from Peter Newman and Jeff Kenworthy, "The end of automobile dependence: how cities are moving beyond car-based planning". The second is the publication of the final report from the EU Evidence project which unequivocally supports the view of this journal that sustainable transport measures and interventions perform better than the traditional non-sustainable interventions. The third publication is a book by John Whitelegg, "Mobility", which assesses over 30 years of sustainable transport debate and concludes that the voluminous work highlighting the many problems and defects of business as usual transport policy is not advancing sustainability in any way at all. It is taking us in the opposite direction. This is because we are all operating under a dominant ideology, the mobility paradigm and the paradigm deletes those things that challenge the paradigm so the paradigm must be overthrown.

Newman and Kenworthy have a track record second to none in homing in on the key issues in sustainable transport and pointing to the irrefutable conceptual and intellectual logic of "doing the right thing". They have now done it again and in a crisp, very clear analysis they demonstrate how the car is already loosening its grip on the mind-set of politicians and planners and we are now able to see the shape of the next phase. The analysis of 44 cities from their own global data base in Chapter 2 provides an empirical basis for what follows far stronger than many traditional transport expositions aimed at expanding road capacity, car parking or shaping cities so that the car becomes the default option. The authors describe how car use is declining in many cities around the world. This is the so-called "peak car" phenomenon. The discussion of peak car use should be a standard part of the training and diet of anyone working in transport and the basis of a simple exam for all politicians based on a few simple questions. Question 1 "Is car use in many cities of the world declining". If you answer

no you have failed the exam. Question 2 applies if you answered "yes" to Q1 and asks "Does this tell us something about the way things are going and the ways we might grasp this opportunity and shape the city of the future?" Question 3 is "Are you going to help this car-reduced future to take shape or do you want to continue to be part of the problem?"

The good news for all students and examinees is that this book is easy to read and provides all the answers so that all remains to be done is to find a way to make sure that transport professionals and politicians read it and pass the exam.

The Evidence projects is an EU funded project to take a hard look at the evidence in support of sustainable transport investments and projects actually delivering high quality, validated economically successful results. An impressive group of researchers from several EU countries trawled the literature and the project report "grey literature" to assemble the evidence in 23 categories (Table 1).

The Whitelegg book takes as its starting point the realisation that sustainable transport interventions and measures are effective and produce multiple, long-lasting social, economic and environmental benefits especially in carbon reduction and dealing with the extremely urgent need to tackle climate change. The book is very clear that we are all suffering from the burden of a huge ideological and paradigmatic obsession with mobility and spending whatever it takes to build more capacity in our transport systems and spend more (allegedly) scarce tax dollars on things that make things worse.

The "Mobility" book sets out a rationale for a transformation of the mobility landscape and argues that the sustainable transport options simply cannot thrive in a world that remains wedded to more mobility and the manifestations of that cultural and political bias (subsidy, infrastructure and an astonishing lack of attention to death, injury, air pollution, climate change and social justice).

Themes	No	Measures	Typical Interventions
Clean vehicles and fuels	1	Electric and Fuel Cell Vehicles	Electric vehicles Electric charging points
	2	Enhancements to ICE technologies	Technology to improve fuel efficiency Alternative fuels for current vehicle fleets
Urban freight	3	Urban freight	Urban freight consolidation centres Cycle logistics
Demand management strategies	4	Access restrictions	Pedestrianisation schemes Limited traffic zones, bus gates.
	5	Roadspace reallocation	Public transport lanes, cycle lanes HOV/HOT lanes
	6	Environmental zones	Low emissions zones 30kmh / 20mph zones
	7	Congestion charges	Urban road pricing
	8	Parking	Parking management Park and ride (P&R)
Mobility management	9	Travel plans (Site-based)	Corporate and public sites Traffic generators (hospitals, stadia)
	10	Travel plans (Personal)	Individual travellers Residents of 'new' housing developments
	11	Marketing and rewarding	Marketing / social marketing Rewards schemes, e.g. Eco driving
Collective passenger transport	12	Public transport enhancements	Integrated ticketing Better access and facilities (E.g. Wi-Fi)
	13	New public transport	New public transport (BRT, LRT, guided bus) Transit-oriented development
	14	Integration of modes	Cross-modal ticketing, Modal interchange (e.g. P&R, bike-rail)
Transport telematics	15	e-ticketing	'Smart ticketing', smartcard, contactless Mobile (Phone) ticketing
	16	Traffic management	Urban traffic optimisation systems Selective priority (E.g. for buses)
	17	Travel information	Information provision Journey planners
Less car dependent mobility options	18	New models of car use	Car Share (city-wide and point-to-point) Carpooling (Including vanpooling)
	20	Walking	Collective walking (E.g. walking buses) Walking infrastructure
	21	Cycling	New routes (on and off-road paths) Bike loan schemes and bike training
	22	Bike sharing	On-street hire (bikes and e-bikes)
	23	Inclusive urban design	Traffic managed through urban design (E.g. home-zones, shared space)

Table 1: The 23 categories of sustainable transport measures evaluated in the EU Evidence project

The book argues for the explicit adoption by all levels of government of 3 zeros:

- *Zero death and injury in the road traffic environment*
- *Zero air pollution from traffic sources*
- *Zero carbon transport*

We have experienced over 200 years growth in mobility measured by the distances we travel every day or every year and this growth is fed by eye watering large subsidies, a persistent bias in politics and planning in favour of more distance and more speed and an astonishing lack of awareness of the huge negative consequences of the growth in mobility. This book takes a detailed, forensic look at mobility and concludes that it is bad value for money, damages health and community life and consumes vast amounts of scarce public cash in the name of more and better infrastructure.

Every government and political party with the exception of the Greens, proclaims the benefits of more airport capacity, more roads and bypasses, more high speed rail and accepts the growth in mobility as good for happiness, wealth and quality of life. This book sets out a very different story. More mobility does not produce the good things in life and kills over 3000 people every day in road crashes, creates noise and air pollution that damage health, feeds the growth of greenhouse gases that make damaging climate change more likely and destroys healthy, active travel and community life in sociable neighbourhoods.

The time has come to bring an end to the mobility fetish, to replace far with near, to create livable and child friendly cities and to bring an end to the role of the car as a default option.

The book shows why this must be done, how it can be done and sets out a policy process to get it done.

All three publications add a great deal to the overwhelming evidence base and case for a significant change in direction, for the abandonment of the mobility paradigm and for working synergistically and assiduously to create much improved cities and regions that actually do improve quality of

life at lower cost than the non-sustainable options and in a way that is ethically, responsible and life affirming and benefits all age groups, both genders and all income groups.

Part of dismantling one paradigm and replacing it with another is that the work load has to go up. Overturning a long term historical mistake like our collective mobility obsession will not happen as a result of high quality evidence alone. That is why Whitelegg emphasises the three zeros and the importance of citizen engagement. If we are to abandon a paradigm and replace it with something that is self-evidently much better we must do whatever we can to promote images and messages that citizens can grasp immediately and weave into thinking, willing and doing. The idea of zero deaths and serious injuries in the road traffic environment in combination with zero mortality and morbidity from air pollution strikes a chord that the majority of citizens can deal with. Similarly the arguments in favour of a zero carbon transport system are sensible and attractive and flow naturally from the other two zeros. Paradigm shift is a matter of ideology and mind-sets and whilst working on evidence we also must work on how to change thinking.

This journal has spent 21 years challenging the dominant ideology and the pervasive nature of the mobility paradigm and that work continues in this issue.

Adams provides us with a remarkably clear insight into cycling and risk and with conclusions that should make decision-makers, politicians and many road safety experts change their approach to risk, safety and security. He points out that the steep decline in road fatalities in Britain is largely due to the reduction in the numbers of those exposed to risk e.g. the 80% decline in cycling since 1952. The decrease is not a road safety achievement and does not endorse our road safety policies as effective interventions. The difference between the two photos (figures 11 and 12), one in London and one in Amsterdam tell their own story. Cycling in Britain is associated with urban warriors and a Darwinian struggle for survival in the urban jungle whereas in the Netherlands (and many other

places) it is an ordinary, everyday activity to be enjoyed. The clear implication of all this is that we have to repopulate our streets, spaces and urban areas with people and produce a dramatic reduction in vehicle traffic and then the sheer weight of numbers doing intelligent, sensible things on pleasant people-centred streets will deliver our sustainable transport objectives including much improved road safety at the same time as much higher levels of use of public space by members of the public not in cars. Readers are encouraged to digest the final few paragraphs of John Adams's article. The brave new world of driverless vehicles might bite back with some unexpected consequences that are most unwelcome.

Bergman and colleagues take us in an unusual but highly productive direction in drawing our attention to different levels of train services in South Africa and using this "window" to explore issues around access, mobility, social inequality and democratisation. The conclusions around entrenching widening socio-cultural gaps between rich and poor are specific to South Africa but have a strong relevance to most other countries that still favour spending disproportionately large amount of public money on projects that benefit the rich and miserly amounts on those that benefit the poor. This applies to the UK and the determination of ministers and many others to support high speed rail at an eye-wateringly high cost and of no possible benefit to those on low incomes or concerned about cuts in bus services and local train services that are just too expensive to use. Wilfred and his colleagues return to a core component of the transport planning and spatial planning agenda which is the link between land use, trip generation rates and the possibility that we can deliver sustainable mobility much more effectively if we intervene much earlier than is usual and manage land uses and trip generation so that we have fewer vehicles and more trips on foot, bike and public transport. This is not a new theme. John Roberts wrote an article in 1992 (Roberts, 1992) on "trip degeneration" and one of the many disappointing aspects of the sustainable transport discourse is that we have a reliable supply of high quality, insightful material that informs intelligent decision

-taking but we appear to be incapable of using it in ways that do improve decision taking.

Rudolph and his colleagues go the heart of the process that leads to many funding and project decisions that support non-sustainable outcomes. The dominance of the economic paradigm, benefit-cost analysis and appraisal all come together to give sustainable transport a tough time when compared with roads, airports and high speed train and we can only echo their call for a change in appraisal and prioritisation that removes this bias.

Finally Holzapfel takes us back to subject we aired in volume 1 number 1 of this journal in the famous Stefanie Boege yoghurt pot study. We know that road freight and logistics has a wonderful reputation for efficiency and sophistication and at the same time it supports a totally illogical and inefficient arrangement that maximises the distances over which products move and has no concept of total logic or efficiency. Holzapfel suggest that transport costs should rise to bring the system more into balance with what can be handled by the road system or, indeed, climate change and health objectives. This is, as he says, politically very difficult but then so is every aspect of transport and this discussion keeps us moving in the right direction.

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ABSTRACTS AND KEYWORDS

Cycling and Safety: change must take root in people's minds

John Adams

Abstract:

This essay is a response to an invitation to provide an overview of the current state of cycling in Britain, and more specifically London, for a conference in Madrid – a city, like London, striving to promote more cycling. The essay focuses on the importance of both the volume of motorised traffic and perceptions of safety as determinants, over time, of the volume of cycling. It notes the dramatic decline (over 95%) since 1950 in the road accident fatality rate in Britain as cyclists, pedestrians and motorists competed for the right to the use of limited road space – and how in selected areas of London cyclists are in the process of regaining their right to the road.

Key words: Risk compensation, risk perception, driverless cars,

The Imaginary of the Train of the Future in South Africa:

From Public Access to Social Exclusion

Zinette Bergman, Manfred Max Bergman

Abstract:

Between 2010 and 2012, South Africa opened successive sections of its first modern mass rapid transit railway system in Gauteng Province, Gautrain. Although Gautrain is frequently juxtaposed with the established Metrorail commuter rail system, which is often described as old and dilapidated, both pale in comparison with the ultra-luxurious leisure train, the Blue Train. These three train systems are indicative of a highly stratified and unequal society, which raises many issues not only about train mobility and access, but also about the imaginary of trains in South Africa. In this article, we explore this by systematically analyzing media representations in order to understand how the present and the future of train travel and mobility are portrayed in contemporary South Africa, particularly in relation to access and democratization. 200 articles, published in 2012, were selected for analyses from various regional and national

English-language newspapers. Using Content Configuration Analysis (CCA), we examined the imaginaries of the three train systems along their conceptual dimensionalities. We found that there is little overlap between the representations of train systems in the media. The dimensions along which they are presented occupy different imaginary worlds. Each is governed by its own set of interpretations, expectations, and appropriations. While Metrorail, also known as the people's train, is presented as outdated and due to be replaced, Gautrain is considered the future of train mobility in South Africa, implicitly entrenching the widening socio-cultural, economic, and political gap between rich and poor, thus excluding the vast majority of South Africans from future opportunities associated with modern mobility.

Key words: imaginary; Blue Train, Metrorail, Gautrain; Content Configuration Analysis; media analysis; public access; exclusion; South Africa.

Effects of Residential Land Use on Trip Generation in Urban Areas: Comparison between Estimated Trip Generation Rates and Planning Practices in Dar es Salaam, Tanzania.

Gordian Wilfred, Hannibal Bwire, Lars-Göran Mattsson, Daniel Jonsson

Abstract:

In cities within developing countries, the development of urban areas is associated with rapid changes in land use. The number of vehicle trips generated in the planned area is related to the types, patterns and characteristics of land use in that particular area. However, it is unclear to what extent land use change affects trip generation rates in planned urban areas. This study examined the effects of land use change on trip generation rates for different residential land uses. A methodology for deriving trip generation rates for different residential land uses was developed. Additionally, the study made comparisons between vehicle trip generation rates provided in land use and transportation planning manuals for local practitioners and rates obtained in the study area. Furthermore, the study identified factors

that should be considered by planners and policy makers in order to reduce the effects of land use change in planned urban areas. The results of this study recommend conducting site or city specific vehicle trip rates, rather than adopting standardized trip rates from transportation manuals.

Key words: Trip generation rates, household characteristics, travel attributes and dwelling categories.

Decision-Making in Sustainable Urban Mobility Planning: Common Practice and Future Directions

Frederic Rudolph, Colin Black, Kain Glessor, Hanna Hüging, Oliver Lah, James McGeever, Giuliano Mingardo, Graham Parkhurst, Aljaž Plevnik, Ian Shergold, Martijn Streng

Abstract:

Transport investment schemes traditionally have to undergo appraisal in order to prove their value for money to funding agencies and also in order to justify the expenditure to electorates. Ex-ante appraisals can also be used to assist in the measure selection process by providing an indication of the costs and benefits of specific policy or infrastructure measures and, with that, allow some comparison of alternatives. While this can be very useful, it also creates substantial challenges, as many smaller-scale sustainable mobility solutions often lack thorough cost-benefit assessments, putting these potentially highly cost-effective measures at a competitive disadvantage compared to large-scale infrastructure projects, for which cost-benefit ratios are generally calculated.

This paper aims to provoke thought on how to select cost-effective measures as part of sustainable urban mobility planning. It discusses the general challenges of determining a transport project's viability, followed by the presentation of five case studies of sustainable urban mobility planning and the role of project appraisal in policy-making processes. On this basis, it points to the challenges cities face in selecting (packages of) cost-effective measures.

There appears to be a fundamental con-

tradiction between the need for assessments to be reliable, but also to be cheap and easy to carry out. This substantially restricts their usability for cities; well-founded appraisal of sustainable small-scale transport and mobility measures could prove to be impossible. One way forward could be to increase policy-makers' awareness of the general benefits of sustainable transport policies and to increase policy-makers' ability to convince their electorates of such policies' merits beyond economic appraisals. This does not necessarily need to be done through extensive cost-benefit assessments: simple and transparent approaches – which increase the visibility of sustainability benefits and the effectiveness of addressing looming problems in cities – might be sufficient to convince decision-makers, and then the public, of the merits of sustainable transport policies. This would not necessarily lead to best value for money, but at least favour sustainable over unsustainable transport schemes.

Keywords: Sustainable urban mobility plans (SUMP), decision-making, project appraisal, urban mobility

Cycling and Safety: change must take root in people's minds

John Adams

I must begin by saying muchas gracias to the organizers of this conference for inviting me to participate. I was much encouraged by the enthusiasm I encountered on the part of those promoting cycling in Madrid, and in Spain more widely. But the way ahead in both our countries is challenging.

In Madrid there has been a small increase in cycling which rose from 0.3% in 2008 to 0.6% in 2009. The city aims for a 500% increase (!) to 3% for 2016¹. London would appear to be only slightly ahead with 3% getting to work by bicycle in 2011 (ranging from 9% in an Inner London borough to less than 1% in some outer boroughs²). As in Madrid it is now a policy objective that cycling should increase³.

Road safety in Great Britain⁴ - the background

Before looking at the safety challenges facing cycling in Britain it will be helpful to look at the wider road safety picture. Figure 1 appears to present a picture of impressive progress – a 96% drop in fa-

talities per billion motor vehicle kilometres between 1950 and 2012. Over the whole of this period fatalities per kilometre decreased by an average 5.3% per year⁵ – a sturdy foundation for the myth that Britain's roads have been getting steadily safer.

Figure 2 presents an even wider picture, and one that provokes challenging questions about how the decrease in Figure 1 has been achieved. It shows the correlation between the national road accident fatality rate per 100,000 vehicles for 134 countries plotted against the countries' scores on the United Nations Inequality-Adjusted Human Development Index⁶. Spain, circled red, scores slightly below the UK on both measures. The Central African Republic, which scores highest on both measures, has a death rate per vehicle over 3000 times higher than Norway, which scores lowest on both measures. All the countries at the lower end of the trend have, like the UK, experienced large declines since 1950. There are some large outliers, so it clearly does not explain everything.

Figure 3 provides a reminder of the importance of the metric chosen to describe road safety progress, or lack of it, over time.

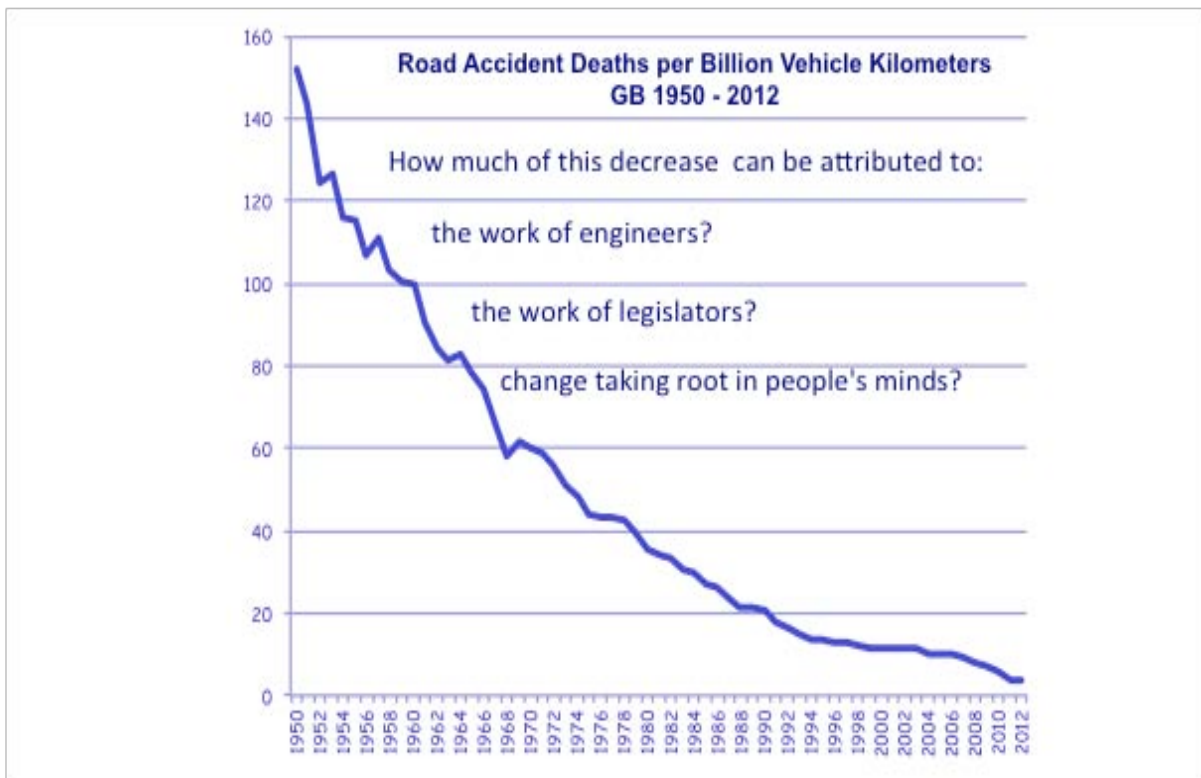


Figure 1: Road Accident Deaths per Billion Vehicle Kilometres GB 1950-2012

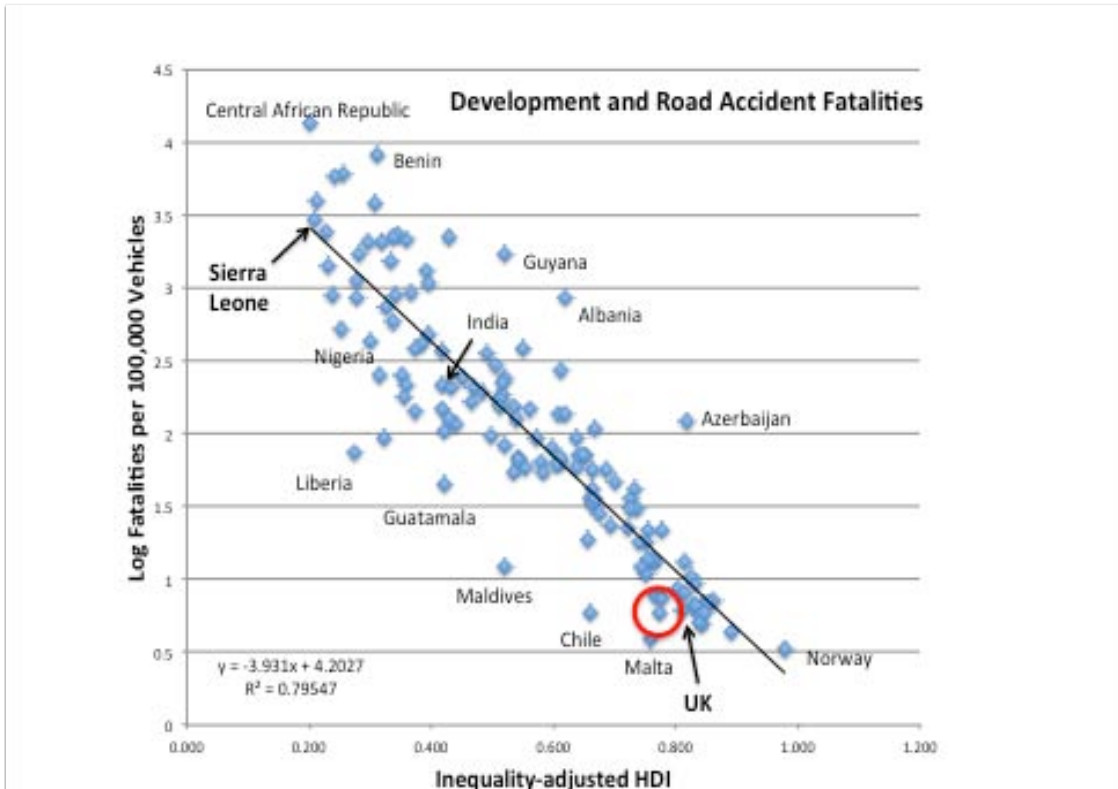


Figure 2: Development and Road Accident Fatalities

It shows that total road accident fatalities per year in Britain, far from decreasing at a steady rate over this period, increased rapidly until the early 1970s. This is because traffic was increasing much faster than 5.3% per year in the 1950s and 60s. While steady progress was being made in fatalities per kilometre in this period, the

total number of people killed in road accidents increased by more than 60%. And while the fatality rate per vehicle in the Central African Republic is more than 3000 times that of Norway, because it has few cars its fatality rate per 100,000 people is merely 5 times that of Norway.

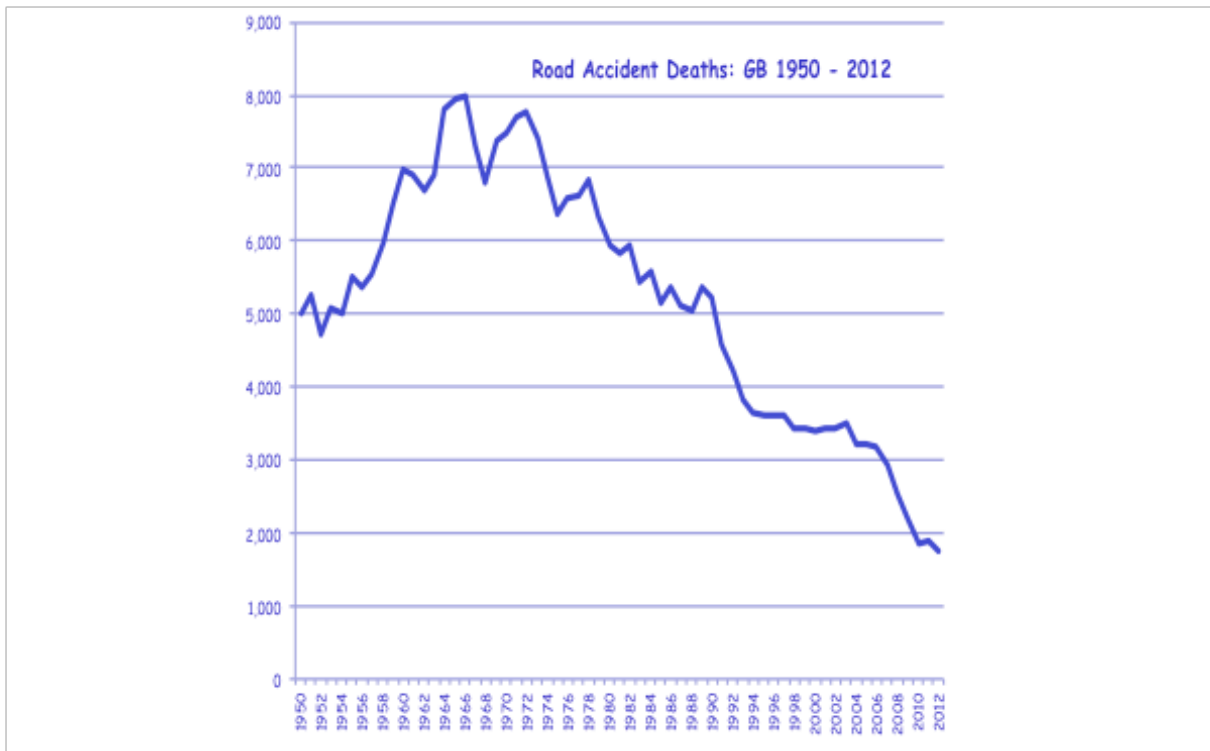


Figure 3: Road Accident Deaths: GB 1950-2012

By either measure, road accident fatality rates in Britain are now far lower than they were in 1950. However, Figure 1 poses three questions about the possible causes of this decline – who or what deserves the credit for the decline?

1) *The work of engineers?* Over this time, engineers have been busy making cars more controllable, with better brakes, suspensions and steering, and also more crashworthy. The highway engineers have also been busy lengthening sight lines, removing roadside obstacles such as trees, installing pedestrian barriers and improving signage but, principally, with projects that segregate motorised traffic from pedestrians and cyclists.

2) *The work of legislators?* The legislators have also been busy passing seat belt laws, motor cycle helmet laws, speed limit laws, drink drive laws and laws forbidding the use of mobile phones while driving.

3) *Change taking root in people's minds?* In this essay I will be backing the contention embedded in this third question – change has to take root in people's minds. This question was provoked by my new favourite philosopher, Michael Sandel of Harvard, who has observed that "Change has to take root in people's minds before it can be

legislated⁷." Almost all of the developing countries toward the top end of the trend in Figure 2 have, on their statute books, laws banning speeding, drinking and driving and the use of mobile phones while driving; and almost all have laws requiring the use of seat belts and helmets. None of them have car-manufacturing industries; they are achieving their extraordinary kill-rates per vehicle with modern imported vehicles with 100 years of safety technology built into them. And the fact that they have inferior roads is unlikely to explain the enormous difference between countries at the top and countries at the bottom; potholes, like speed bumps, slow traffic and reduce the severity of the accidents that do occur. So what else is going on?

Figure 4 provides an example from the United States of a phenomenon to which the Sandel dictum might be applied. In 2010 the Insurance Institute for Highway Safety published the results of a study that confounded their expectations. Four states, California, Louisiana, Minnesota and Washington, passed laws banning texting while driving – laws passed with the intention of reducing "distracted driving". These laws constituted natural experiments. Each state had on its borders other states that had not passed such

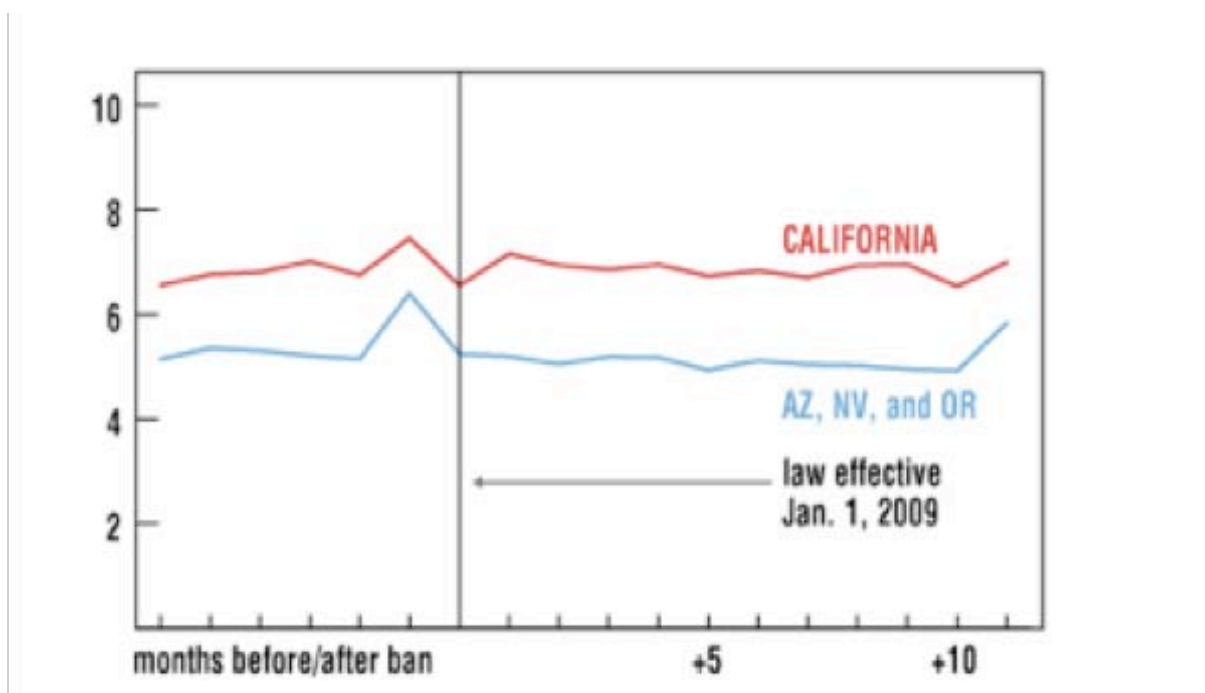


Figure 4⁸: California - Collision claims per 100 insured vehicle years, by month before and after texting law for all drivers, compared with Arizona, Nevada and Oregon

laws, and these states served as controls by which the effects of the banning laws were measured. The result was: "texting bans don't reduce crashes; effects are slight crash increases." Figure 4 displays the result for California, measured against the control states of Arizona, Nevada and Oregon. This unexpected result was described by the authors of the study as a "perverse twist".

Apparently the change in the law was not accompanied by a change that had taken root in people's minds; or rather not the desired change. A law that was intended to decrease "distracted driving" appears to have increased it. The report's somewhat tentative conclusion: "clearly drivers did respond to the bans ... what they might have been doing was moving their phones down and out of sight when they texted, in recognition that what they were doing was illegal. This could exacerbate the risk of texting by taking drivers' eyes further from the road and for a longer time."

The Sandel dictum and the "perverse twist" illustrated by Figure 4 are consistent with the Risk Compensation Hypothesis set out in Figure 5.

The model postulates that:



Figure 5⁹: The Risk Thermostat

- everyone has a propensity to take risks – the setting of the thermostat;
- this propensity varies from one individual to another;
- this propensity is influenced by the potential rewards of risk taking;
- perceptions of risk are influenced by experience of accident losses – one's own and others';
- individual risk-taking decisions represent a balancing act in which perceptions of risk are weighed against propensity to take risks; and
- accident losses are, by definition, a consequence of taking risks – to take a risk is to do something that carries with it a probability of an adverse outcome; the more risks an individual takes, the greater, on average, will be both the rewards and the losses he or she incurs.

Figure 2 suggests that, as with the work of legislators, change must take place in people's minds before the safety efforts of engineers can produce their intended benefits. As noted above, the countries toward the top of the trend line are achieving their impressively high road accident death rates with imported cars with 100 years of safety technology built in to them.

Now let's look at cycling (and walking)

While total road accident fatalities were

increasing rapidly in Britain up to the early 1970s, cyclist fatalities were dropping steeply – Figure 6. And while total road accident deaths per kilometre travelled had

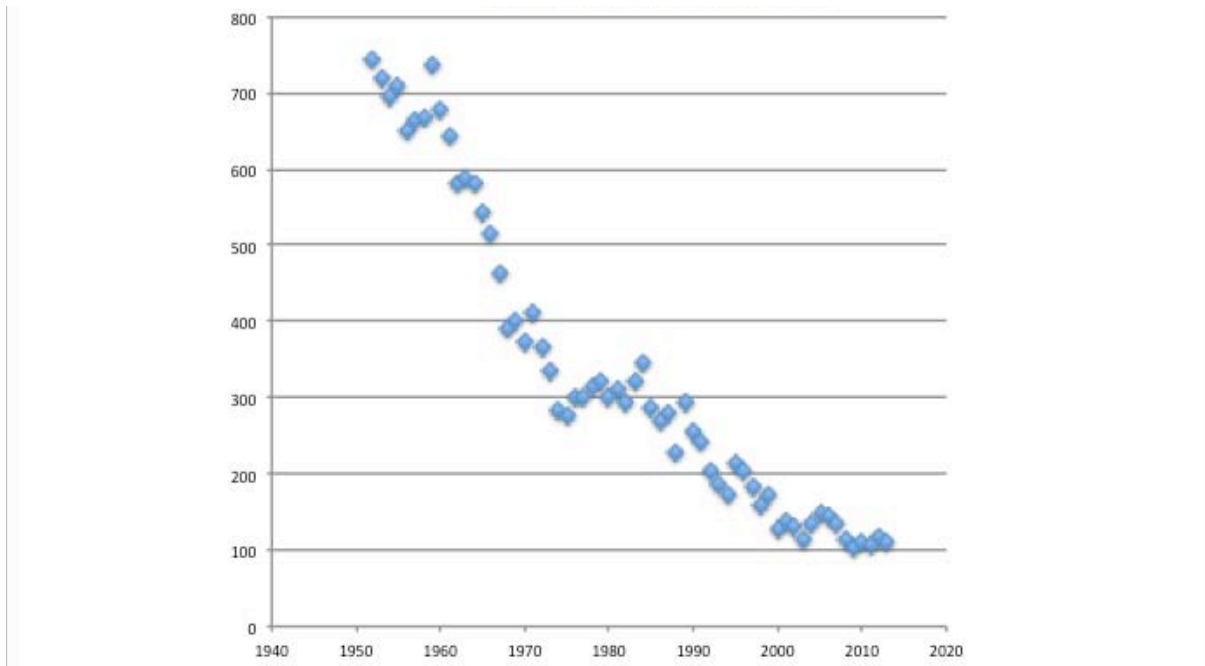


Figure 6: Cycling Fatalities GB 1952-2013

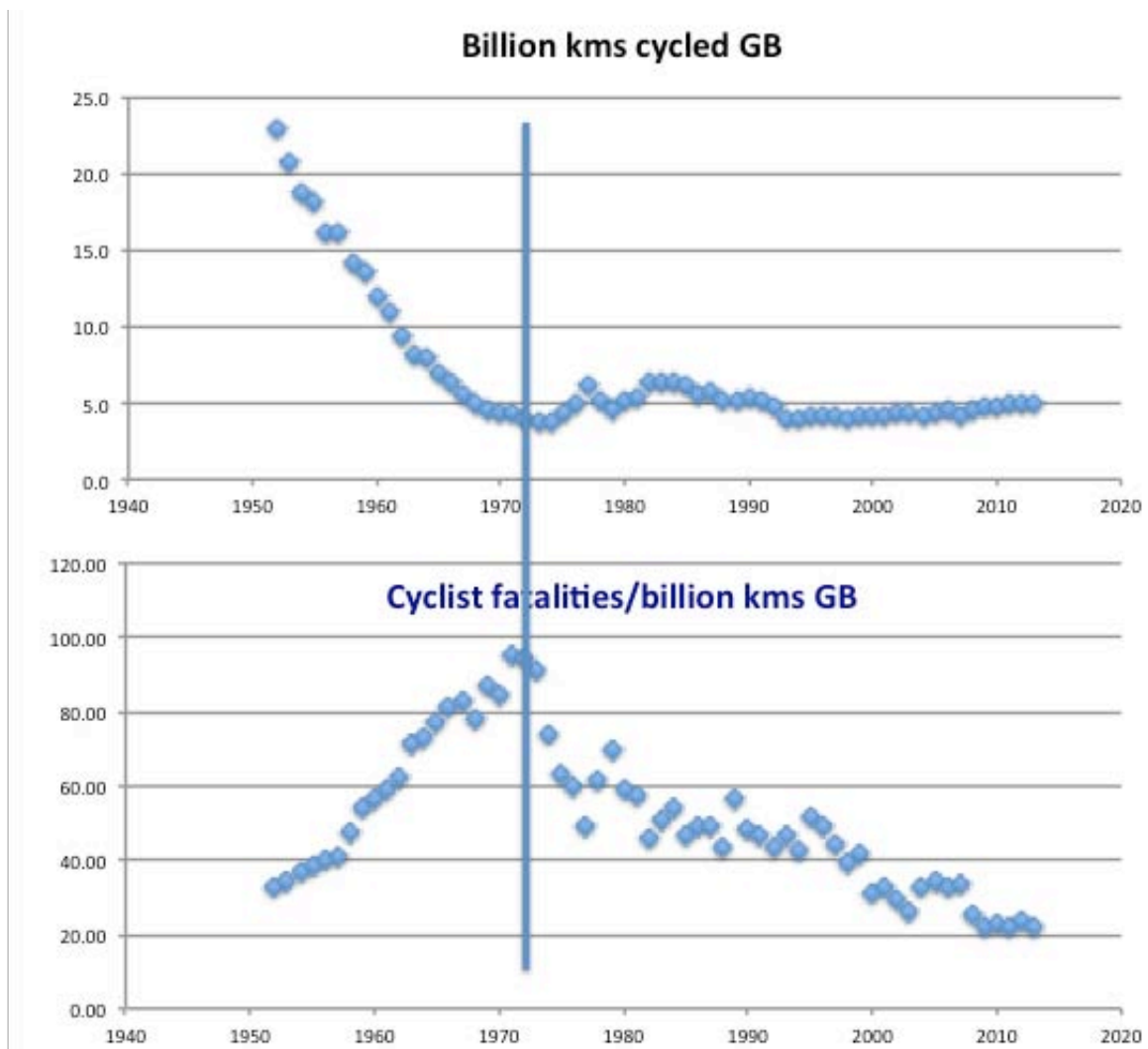


Figure 7: Km cycled and fatalities/billion km GB

been dropping in Britain, cyclist fatalities per kilometre cycled rose steeply until the early 1970s. This can be explained by the precipitous – 87% - decline in cycling during this period shown in Figure 7. Figure 7 also shows that the peaking in fatalities per kilometre cycled coincided with the trough in numbers of kilometres cycled. I would be fascinated to know if comparable Spanish data exist.

Figure 8 provides another perspective on this trend by highlighting the enormous change in the modes of transport used by Britons over this period.

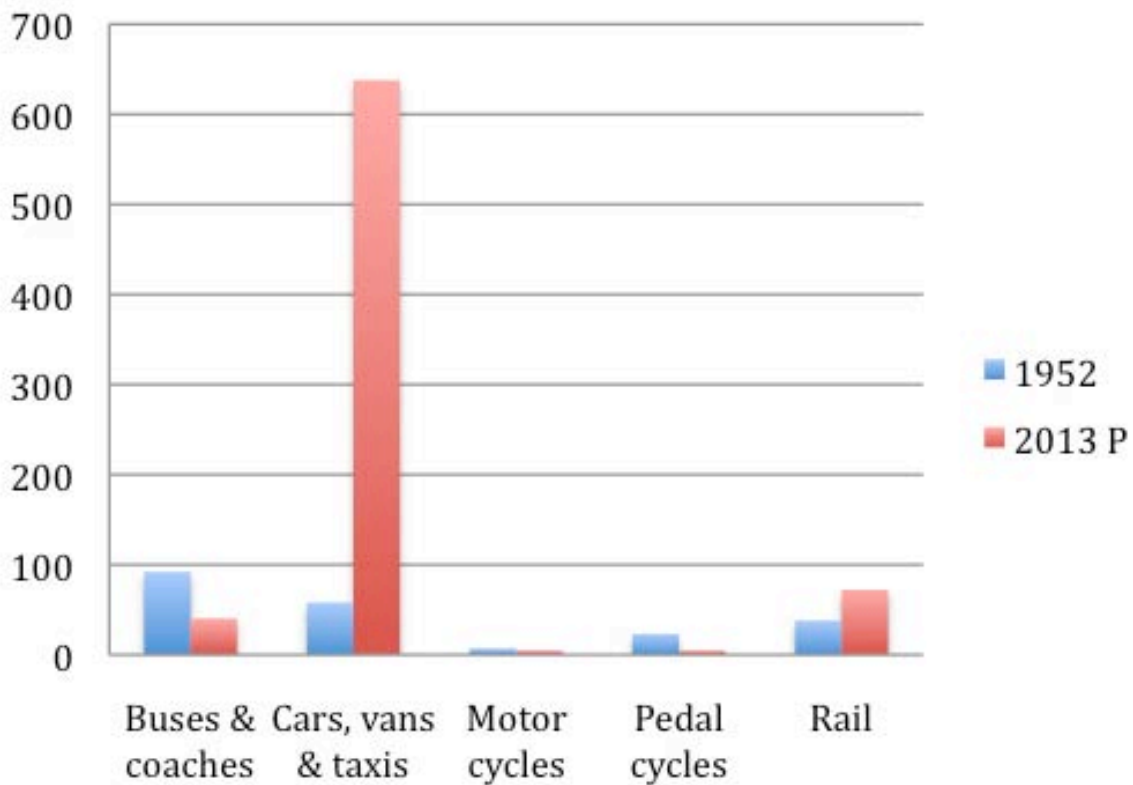


Figure 8¹⁰: Passenger Transport GB, billion kms, 1952 & 2013

It shows that while bus and coach traffic had more than halved since 1952, and cycling had fallen by almost 80%, car and van traffic had increased 11 fold. And although passenger traffic by rail had increased, it had almost halved as a percentage of the total. Over this period of enormous increase in motorised traffic the length of Britain’s roads increased by less than a third. And most of the new roads (76%) were minor roads built to accommodate the ex-urban sprawl generated by new car owners looking for road space on which to drive and places in which to park. Cyclists were forbidden on the new roads

labelled “motorways”, and strongly discouraged on new dual-lane A roads. The nature of this discouragement can be inferred from the official guidance offered in the Highway Code to cyclists using them¹¹:

- “If you are turning right, check the traffic to ensure it is safe, then signal and move to the centre of the road. Wait until there is a safe gap in the oncoming traffic and give a final look before completing the turn. It may be safer to wait on the left until there is a safe gap or to dismount and push your cycle across the road”, and
- “Remember that traffic on most

dual carriageways moves quickly. When crossing wait for a safe gap and cross each carriageway in turn. Take extra care when crossing slip roads.”

And at roundabouts

- “You may feel safer walking your cycle round on the pavement or verge. If you decide to ride round keeping to the left-hand lane you should be aware that drivers may not easily see you. Take extra care when cycling across exits. You may need to signal right to show you are not leaving the roundabout -watch out for vehicles crossing your path to leave or join the rounda-

bout.” And

- “Give plenty of room to long vehicles on the roundabout as they need more space to manoeuvre. Do not ride in the space they need to get round the roundabout. It may be safer to wait until they have cleared the roundabout.”

In brief, the official advice to cyclists was to defer to the needs and speeds of motor vehicles and the imperfect vision of their drivers. And, on occasion, in the interests of their own personal safety, consider foregoing their right to use the road and walk around the traffic instead.

But what about pedestrians? While reliable figures for walking in Britain for much of this period do not exist, it also almost certainly declined steeply, although the start of the decline in walking may have been delayed until the early 1970s. While cyclists were competing directly with cars for road space, most pedestrians still had sidewalks. A 1971 study of five primary schools in England revealed that 80% of seven and eight year old children still got to school unaccompanied by an adult. A

follow-up study of the same five schools in 1990 revealed that this number had dropped to 9%¹². And now, 25 years on, parents who permit such behaviour face threats of being reported to the social services for being irresponsible parents¹³. Figure 10 from a Ministry of Transport campaign in 1982 conveys the flavour of official advice being dispensed at the time.

At the start of this essay I referred to the “myth” that Britain’s roads were getting steadily safer over time. The decline in pedestrian fatalities shown in Figure 9 almost certainly mirrors a steep decline in pedestrian exposure to risk. The poster in Figure 10 suggests that roads were perceived as getting so dangerous that children could no longer be allowed out unaccompanied.

Much of the remarkable 96% reduction in the number of fatalities per motor vehicle kilometre on Britain’s roads since 1952, displayed in Figure 1, has been attributed in this essay to the large reduction in the numbers of vulnerable road users (cyclists and pedestrians) who were crowded off the roads by the enormous increase in

Pedestrian fatalities GB

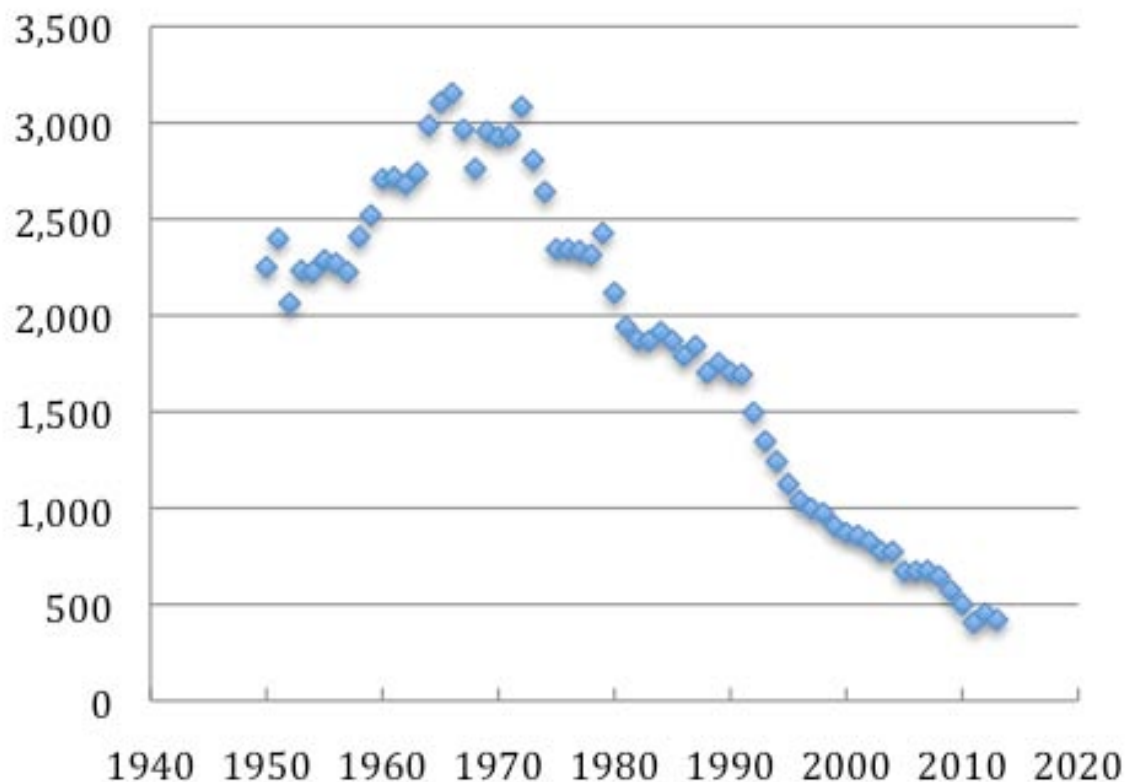


Figure 9: Pedestrian Fatalities GB



Figure 10¹⁴: 1982 Ministry of Transport campaign poster

numbers of cars. While some cyclists and pedestrians transferred willingly to cars, many others, retreated or, in the case of children, who were no longer permitted unsupervised on the streets, were withdrawn, out of fear. But Figure 2 (where I plot development against road accident fatalities) suggests that more careful, less aggressive driving also deserves a share of the credit. Anyone who has experienced traffic in countries at either end of the trend described in Figure 2 cannot fail to have observed the dramatic difference in the attitudes of road users, both in vehicles and on foot or bicycle, to the risks of being on a road. As motorisation increases, change does take place in people's minds.

What might the future hold?

In Britain at the time of writing, while cycling is still retreating in most of the country, it is experiencing a revival in a few urban centres; and the centre of London in the morning rush hour has become a cycling hotspot, with 24% of vehicles on

the road being bicycles. The mayor of London has published his "Vision"¹⁵ - a plan to transform London into a larger version of Amsterdam in which cycling will become "normal, a part of everyday life". He has designated three London boroughs "Mini-Hollands" in the hope that his programme "will help make them as cycle-friendly as their Dutch equivalents."

His Vision contains a few kilometres of spacious Dutch style "cycle superhighways" and modest plans for traffic calming measures in the Mini-Hollands, but on most streets cyclists will still be left to contest their right to the road with motor vehicles or to struggle on a few more kilometres of seriously inadequate cycle lanes. At present cycling in central London's morning rush hour is an experience largely confined to aggressive, helmeted young urban warriors, shown in Figure 11 bravely competing for road space. Figures 12 and 13 illustrate the distance yet to be travelled before cycling in London will feel like an Amsterdam experience.



Figure 11¹⁶: Morning Rush Hour, London

Cycling to work in Amsterdam is an altogether more relaxed experience, not requiring special head protection. And cycling to and from school (Figure 13), something London children are not permitted to do, is a normal activity in the Netherlands. In London, the mayor of London's Vision of

safe Dutch streets is likely to face competition from a new quarter – in the form of a central government vision of a country in which everyone moves about in driverless cars. Central government is backing its vision with taxpayers' money. In its most recent budget it earmarked £100 million,



Figure 12¹⁷: Morning Rush Hour, Amsterdam



Figure 13¹⁸: Home Time at a Dutch School

to be matched by an industry investment of the same amount, “to ensure the UK is at the forefront of the testing and development of the technologies that will ultimately realise the goal of driverless vehicles.¹⁹”

Progress has been impressive. There are now, available online, numerous video demonstrations of the superior safety of driverless cars; they do not suffer from lapses of concentration and they can be programmed, in situations of conflict, to defer to any pedestrians or cyclists that they might encounter. Here is a description of what has already been achieved, by Astro Teller, the man in charge of Google’s driverless car project:

“A few months ago our self-driving car [with a safety driver in the car] encountered an unusual sight in the middle of a suburban side street. It was a woman in an electric wheelchair wielding a broom and working to shoo a duck out of the middle of the road. ... the car did the right thing. It came autonomously to a stop, waited until the woman had shooed the duck off the road and left the street herself and then the car moved down the street again.²⁰”

And here is the vision of Sergey Brin, co-founder of Google, of what might be achieved once this programmed deference

of driverless cars has been perfected: “... if cars could drive themselves, there would be no need for most people to own them. A fleet of vehicles could operate as a personalized public-transportation system, picking people up and dropping them off independently, waiting at parking lots between calls. ... Streets would clear, highways shrink, parking lots turn to park-land.²¹”

And here is Elon Musk, co-founder of PayPal and Space X and chairman of Tesla Motors highlighting the safety of driverless cars:

“People may outlaw driving cars because it’s too dangerous. You can’t have a person driving a two-tonne death machine.²²”

And Sebastian Thrun, also involved in the development of the Google car, making the same point after presenting impressive video evidence of the car safely negotiating dense urban traffic in California:

“I really look forward to a time when generations after will say how ridiculous it was that humans were driving cars.²³”

The mayor’s vision and that of the developers of driverless cars would appear, at first glance, to be mutually supportive.

In *The Pathway to Driverless Cars* the UK Government concludes that during the development phases, the existing legal and regulatory framework will not be a barrier to the testing of automated vehicles on public roads "providing a test driver is present and takes responsibility for the safe operation of the vehicle." But the ultimate goal is the elimination of the test driver; the development of cars that will drive themselves.

So how would Google's "deferential" vision work in jostling central London where I live? Or in the crowded streets of Madrid? I have found no explorations of the question. How might other road users respond? Children, almost certainly, will have discovered a new game – bowling balls across the street to see how quickly cars stop. The rest of us – on foot or bicycle – will also become aware of our new power to annoy people in cars.

All of the descriptions and video demonstrations of progress so far that I have been able to find with the help of Google (itself the leading proponent of self-drive cars) demonstrate quite convincingly that, in a future in which all cars are self driven, interactions between cars could be controlled in a way that would make car travel safer and more efficient – on motorways or on any other roads from which pedestrians and cyclists are excluded.

But these descriptions and demonstrations also stress that in the case of interactions between cars and vulnerable road users (pedestrians and cyclists – plus cats and dogs) the cars will have to be programmed to behave deferentially. Moral reckoning to one side, anticipation of the public relations disaster that would follow the first killing of a child by a driverless car demands fail-safe programmed yielding to those on the street but not in cars.

This deference would clearly become obvious to pedestrians and cyclists, and the Risk Compensation Hypothesis discussed above predicts a behavioural response. Secure in the knowledge that they were now kings and queens of the road, their behaviour would surely change. Pedestrians would no longer cower at the roadside trying to judge whether gaps in the traffic

could see them safely to the other side. They would be liberated to stride confidently into the road knowing that traffic would stop for them. And cyclists, not just children, could enjoy the freedom to cycle two or three abreast with friends holding up middle fingers to the cars honking behind. (Will they be programmed to honk?) Consider the cyclists in Figure 11. Knowing that all the motor vehicles were programmed not to hit them, would they not claim much more of the road? The fail-safe programmed deference of which the proponents of driverless cars boast will, in crowded streets such as that pictured in Figure 11, result in the deferential paralysis of motorized traffic.

Might the dramatic decline in cycling since 1950, and in walking since the early 1970s, be reversed by the advent of deferential cars? After many decades of retreat before the advance of the car, might cyclists and pedestrians start to reclaim the road space that they have yielded? There is much talk about such cars creating the need for a revision of the rules of the road; Britain's Highway Code referred to above would need to be re-written. But How?

Either deference will prevail, leading to the deferential paralysis referred to above. Or roads and laws will need to be changed to produce motorway style segregation of motor vehicles and vulnerable road users. Or cars will have to be programmed to insist on their legal right of way at the cost of death and injury. Cyclists, careless distracted pedestrians on mobile phones, heedless children, cats and dogs, broom-wielding women in wheel chairs, and many others would have to be programmed as legitimate victims to be sacrificed in the name of efficient traffic management.

The developers and promoters of driverless technology are amongst the world's most profitable enterprises. They are investing many billions of dollars in the project and are promoting it enthusiastically. They have a clear interest in the rules of the road allowing space for their cars, and a proven ability to mold public opinion and influence government policy.

Change will take root in people's minds. *What will this change look like?*

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ture in South Africa: From Public Access to Social Exclusion

Zinette Bergman, Manfred Max Bergman

*there is no comfort here/in this third class
coach/on this green seat
i twitch and glance around -/there are
few too few travelers/on the night train/...
i must get out of here soon/for in this
coach there is a smell/which haunts me
not the smell of stale man but/the whis-
pering nagging smell of fear*
Fhazel Johannesburg¹

Introduction

Global patterns of development in public rapid transport systems have resulted in the compression of time and space by increasing transport capacity and speed, and by reducing costs (Vincent-Geslin, Ravalet, & Kaufmann, 2015). Compared to cities in advanced economies, African cities are conspicuously absent from the list of 'best practice' of urban mobility, i.e. "socially inclusive, environmentally friendly and economy-promoting" (United Cities and Local Governments, 2009: 17). Instead, similar to other countries in Sub-Saharan Africa, South Africa...

"...face[s] an unprecedented crisis of passenger and goods movement.... Citizens, entrepreneurs and city and national governments in ASSA [Anglophone Sub-Saharan African] countries face the challenge of meeting the rising demand for urban travel and freight movement at the same time as they need to deal with backlogs of infrastructure maintenance, rising traffic congestion, increased fuel costs and noxious vehicle emissions.... In the major ASSA cities, these problems are aggravated by the shortage of skills and capacity in government that hampers efficient service delivery, by public expectations of achieving better personal mobility through car ownership, and by settlement in unplanned, unregulated informal spaces, which maximize the need for private transport" (Pirie, 2013: 1).

Train systems are well-established in con-
1 South African Black Consciousness poet,
born in Johannesburg in 1956.

temporary South Africa. Metrorail, for example, South Africa's state-owned national commuter rail system, transports more than 2 million passengers daily. However, the lack of investment in transport infrastructure and services over the past decades has resulted in an ailing and rapidly deteriorating national train system. Because South Africa has been unable to maintain its affordable and publically accessible rail services in the past 30 years, Metrorail has "for some time been battling overwhelming challenges, which include an ageing fleet, lack of regular maintenance of its stock, ineffective depot management and outdated signaling systems – which cause fatal crashes – among others" (Transnet, 2011: 16). Metrorail trains are described as inefficient, unreliable (Coetzee, 2013), and unsafe (Maluleke, 2013), and passengers are frequently exposed to violence, intimidation, theft, and discomfort (Transnet, 2011).

Another train system in South Africa is Gautrain, a mass rapid transit railway system in Gauteng, the most populous and economically successful province in the nation. It is "home to approximately 7 million people, and has sufficient population density, wealth and size to merit the project" (Pirie, 2009: 10). Currently, Gautrain connects the central business districts of Pretoria and Johannesburg with the international airport (O.R. Tambo International) and, between them, major shopping malls, banking and technology centers, many upscale residential areas, and some of the top universities in the country.² This rapid rail link "has been an instant success. It has diverted many private car journeys onto rail, substantially reducing the time spent accessing the airport, reducing parking congestion there and vehicle emissions en route. In its first three months of operation in 2010 the Gautrain carried one million passengers, including intra-urban commuters" (Pirie, 2009: 10). The reputation of Gautrain is reported to include world-class service, being technologically advanced, as well as economically and environmentally sus-

² In October 2014, a consortium of Transaction Advisors was appointed by the Gauteng MEC for Roads and Transport to conduct a feasibility study to determine whether Gautrain extensions are compatible with the Gauteng 25-Year Integrated Transport Master Plan (2014). The feasibility study will be completed in the latter part of 2015.

tainable (Bombadier, 2013).

While Metrorail can be considered the train of the people and Gautrain the future of train travel in South Africa, train mobility in South Africa also includes the ultra-luxurious Blue Train, an exclusive cruise train that combines world-class service and luxury accommodation in the setting of some of South Africa most beautiful, bucolic landscapes (Blue Train, 2014).

These three rail systems seem to operate in parallel worlds in terms of their purpose, the services they provide, and the passengers they cater for. In this study, we examined how these mobility systems form part of a public discourse in South Africa that connects differing mobility needs and expectations with socially divisive discourses, pointing toward a future of mobility-induced social segregation in South Africa beyond racial lines. We explored the shape of the respective train imaginaries, and we examined how they reify spatial and sociocultural exclusion at the expense and detriment of the South African majority and for the benefit of a small and affluent elite. The link between mobility and inequality is well-researched (e.g. Blowers & Pain, 1999; Hamilton & Hoyle, 1999; Kaufmann, Bergman, & Joye, 2004; Ohnmacht, Maksim, & Bergman, 2009; Scheidegger, 2009). Although there are many social, political, cultural, and economic conditions influencing mobility, accessibility, and choice (Mandersheid & Bergman, 2008), the topic of sustainability of urban transport, i.e. "the social (mal)distribution of the benefits and costs of transport services"(Pirie, 2013: 29) in countries such as South Africa remains under-researched. Other authors have also pointed out that "more work is needed to better understand how transportation benefits can be equitably distributed across society, especially to marginalized communities" (Renne & Bennet, 2014: 8), which underscores the importance of understanding "the links between transport, mobility and accessibility and the links with sustainability, health and quality of life" (Whitelegg, 2014: 3). This is especially relevant in developing countries, which often lack the extensive multi-modal infrastructure needed to create sustainable mobility networks. In these contexts, the

successful implementation of sustainable mobility policy and practice will depend on carefully blending sustainable mobility goals with the needs and expectations of highly stratified and unequal societies in ways, which do not exacerbate social division, exclusion, and conflict. By examining the media discourse on trains in South Africa, this article aims to contribute to this debate by exploring how contrasting commuter needs and expectations connect not only to specific mobility systems, but also to notions of access, inclusion, and exclusion. Of particular interest in this article is how the imaginaries of the three contrasting train systems as presented in South African newspaper articles structure expectations and purposes and, thus, may have implications for access and social integration. By examining the imaginaries of these trains in the South African print media, we explore how public mobility systems connect to the potential of being mobile in this unequal society. The two research questions guiding our focus and analyses are: What are the imaginaries of three train systems in South Africa – Gautrain, Metrorail, and the Blue Train – as reported in the South African news media?, and How does each imaginary signal public socio-spatial access or exclusion of a declining and an emerging train system?

Methods

The newspaper articles for this paper were sampled from 14 regional and national English-language newspapers published in South Africa. Articles were downloaded from the Independent News and Media Database (www.iol.co.za) and the Mail and Guardian (www.mg.co.za). Two further selection criteria were that articles had to deal explicitly with one of the three South African passenger train systems, and that they had to have appeared in 2012. In total, we analyzed 7 articles on the Blue Train, 85 on Metrorail, and 108 on Gautrain were analyzed, using Content Configuration Analysis (CCA; Bergman, 2011; Bergman & Bergman, 2011). CCA is a systematic qualitative analysis method for non-numeric data (Bergman, 2011), closely related to qualitative content and thematic analysis.

The Imaginaries of Three Train Sys-

tems in South Africa

The imaginary of the Blue Train

News reports on the Blue Train present an imaginary dominated by descriptions of opulent luxury and exclusivity, illustrated by narratives on rare and opulent furnishings, world-class service, exquisite dining experiences, and an affluent foreign clientele. Most reports in 2012 focused on awards associated with luxury lifestyles, which include the Condé Nast Traveler Award, the Diners Club International Merit Award, and national and international awards for the best wine list in the dining cars. Here two illustrative examples:

- The Blue Train [is] considered by many to be the finest scenic train in the world. (06-15-2012, World's greatest, IOL)
- The Blue Train clinched the title of the 'World's Leading Luxury Train' at a global award ceremony in Doha, Qatar. (01-19-2012, SA honoured, IOL)

Articles on the Blue Train also cover the African National Congress' (ANC) Centenary Celebrations, which took place in a chartered Blue Train. Integrating the Blue Train into the nation's most important political event of the year illustrates the elite status of the Blue Train:

Bloemfontein might have been hot and dry for most of this weekend but it was dripping in gravy, the sort dished out by a generous sugardaddy who turned 100 on Sunday.... Dodging potholes and overzealous traffic cops who blanketed the city, the well-heeled were sure to impress their fellow comrades, arriving in top-of-the-range Mercedes Benzes, BMWs, Audis and Range Rovers. ... ANC Western Cape secretary Songezo Mjongile said three trains had left Cape Town for Bloemfontein, including a luxurious Blue Train which had been specially chartered for the landmark event. (01-09-2012, ANC Centenary Celebration, IOL)

When a fire broke out on a Blue Train journey from Johannesburg to Cape Town in November, it was not the fire that was the

focus of the news item but the unprofessional conduct of Blue Train staff in juxtaposition to the high ticket prices:

According to passengers, there was chaos on the train... [A passenger] said the handling of the emergency was shocking, especially considering the high costs of the tickets. According to the rates on the Blue Train website, a ticket in high season costs between R15 000 and R21 000 a person between Cape Town and Pretoria.³ (11-30-2012, Staff 'clueless' during Blue Train blaze, IOL)

Although no one was injured and the fire was contained quickly and without causing much damage, the reportedly disorganized actions of staff members contradicted what people expect from the Blue Train and became the center of the ire of passengers and, thus, the focus of the media reports. Apparently, the imaginary of the Blue Train not only excludes breakdowns or delays but, especially, unprofessional service to its passengers, even in the event of a crisis. Instead, it nourishes high expectations at an exclusive price. The Blue Train imaginary goes further yet: its central core as presented in the newspaper articles is akin to an exclusive resort or country club, rather than that of a train, and passengers are akin to club members. Spatial movement, in contrast, seems incidental to the Blue Train experience. For example, passengers are often provided with a return flight, including airport transfers, to the original departure point of the Blue Train journey, almost as if the displacement to another city is an inconvenience that needs to be rectified quickly and efficiently. It may be more appropriate to describe the Blue Train experience as staying at, rather than riding on, the Blue Train. The meaning of train travel and its passing landscape as witnessed through windows morphs into residing in luxurious quarters with an accompaniment of aesthetically pleasing, exotic, and moving landscape pictures, viewed from the exclusively cocooned accommodation arrangements and dining car. Revealing in this context is that most economic, po-

³ According to the national census, the median annual income of black working South Africans was R12 000 in 2011.

litical, or cultural realities associated with the continent and South Africa in particular are completely absent in the media discourse. Instead, the visual aesthetics of a changing, untrammelled, savage-yet-pleasing African landscape, cleansed of its social and physical realities, are fully integrated into the cocooning comfort of a resort-like experience. South African economic and political realities seem to take place elsewhere, rather than just beyond the centimeter of windowpane, removed beyond the imaginaries from not only its passengers but also from all media reports on the Blue Train.

In 2012, there were only 7 reports on the Blue Train in the 14 newspapers selected for analysis. Interesting here is that, even though the Blue Train is distal from mainstream public discourse, none of the articles need to explain to its readers the Blue Train. This, in part, reflects the high salience of what the Blue Train stands for, far beyond the small elite that is in a position to afford a "stay" on the Blue Train.

The imaginary of Metrorail

In contrast to the Blue Train, Metrorail is usually presented as an affordable yet unreliable and perilous mode of travel for the poor. In the newspaper articles, Metrorail trains are portrayed as outdated, dirty, defective, undependable, unsafe, and overcrowded. Long-term neglect of the infrastructure and an increasing demand for cheap travel, particularly to and from work, ostensibly stretch the capacity of this train system beyond its limits. Newspaper articles on the Metrorail system routinely focus on three interrelated thematic areas: general disrepair and unreliability, overcrowding, and accidents and crime. The following are illustrative quotes from the newspaper articles on its general disrepair and unreliability:

...late trains, cancelled trains, trains covered in graffiti, passengers who are assaulted and robbed and, more recently, despite no improvement of any kind in the service, a huge fare hike. (04-18-2012, Carlisle banned from Metrorail, IOL)

[President Jacob Zuma's] tour on Thurs-

day, dubbed "The president's monitoring visit 2012" was organised for him to get a personal taste of public transport in Gauteng during rush hour.... Zuma said public transport systems in the country had to change. "Commuters were complaining. I have been told that the trains are not reliable, there is no security and at times they just stop in the middle of nowhere. Workers are struggling to get to work, that is not good for the economy," he told reporters. "I am more convinced now that we need faster and (more) secure trains." (06-14-2012, Metrorail's service, MG)

Overcrowding is another theme that dominates the newspaper articles on Metrorail. Here two examples:

Metrorail said each train transports an average of 850 to 1 000 people per trip. But Carlisle [Transport and Public Works MEC Robin Charlisle] said up to 4 000 people travel per train to and from work. "These trains are grossly overloaded, but that is the reality of how the majority of the city's people get to work," he said. (02-05-2012, Sabotage, fuel hike, IOL)

A total of 17 people were injured in an early morning stampede at Pretoria's main Bosman train station on Thursday. ... Commuter Tshepo Mashele, of Mamelodi East, blamed the stampede on the overloading of trains, which he said was a daily occurrence. "We are exposed to pushing and shoving every day." (05-10-2012, 17 hurt, IOL)

The majority of crime and crime-related stories in the media are associated with crimes against the Metrorail system. It includes cable theft, vandalism, and the torching and stoning of trains. There were some reports on violence or accidents, such as when people are injured or die during a stampede at a station, while illegally crossing the train tracks, or in relation to train accidents. Interestingly, these are rarely presented as mere accidents but associated explicitly with the poor state of Metrorail trains. Here an example:

A Metrorail train with about 500 pas-

sengers crashed into a stationary goods train at Fisantekraal train station near Durbanville on Tuesday night ... "If we had our wish, we would be scrapping these trains in the next three years, because they will not be safe to carry people beyond this date." (20-06-2012, 500 escape, IOL)

Despite the considerable prevalence of reporting on violence and crime in South African newspapers in general, there are only two cases of Metrorail-related violence reported in the media in 2012⁴. In one incident, a security guard shoots and kills a commuter, in the other a train driver is stabbed to death.

Failing infrastructure and vandalism

Two sets of justifications are implied in the newspaper articles to explain the persistence of the three problem areas: an external that implicates infrastructure and other externalities, and an internal that emerges from the communities themselves, fueled by poverty and frustration.

Within the media narratives, external pressures are created by gaps in infrastructure and its support systems in the form of an aging, dilapidated rail system. The outdated and failing train system is reportedly plagued further by power outages, electricity and fuel hikes, mounting political pressure and associated political infighting, and the powerful influence of rail-related labor unions. Towards the end of 2012, officials announced that the Metrorail fleet had reached the end of its capacities:

"If we had our wish, we would be scrapping these trains in the next three years because they will not be safe to carry people beyond this date," [Montana, the chief executive of parastatal, the Passenger Rail Agency of SA (Prasa)] said... [Metrorail] trains failed to meet international standards in most respects except the heating system. Montana warned that many of the coaches – almost all of which are between 20 and 50 years old – would

soon become unsafe. Standards that failed included modern safety features such as "automatic train protection" systems and the "enduring crashworthiness" of passenger coaches. (06-20-2012, 500 escape, IOL)

"The investment backlogs in signalling and infrastructure, including maintenance depots for rolling stock, relate more to an obsolete system at the end of its design life and outdated technology, due to decades of under-investment in the system, now requiring total renewal and modernisation," said Martins [Transport Minister]. He said 86 percent of the national signalling installations had reached the end of their design life. (11-14-2012, Metrorail faces, IOL)

According to the media reports, the conditions of the trains and train travel have an effect on commuters and, thus, imprint themselves on the Metrorail imaginary. Throughout 2012, the news media reported on reactions of commuters' frustrations. Here two illustrations:

Metrorail spokeswoman Isabel van de Westhuizen said rail commuters usually vented their frustration over poor or late services by torching or vandalizing train carriages, not realising that the delays were often caused by copper cable theft. (09-27-2012, Rail cable thieves, IOL)

"What started as simple acts of vandalism have escalated to a full-on attack to destroy Metrorail," Carlisle said. Lindelo Matya, Metrorail regional manager, said damage had become so frequent that incidents outstripped the rate at which repairs could be done. (02-05-2012, Sabotage, fuel hike, IOL)

At times, frustration-fueled vandalism and poverty-based theft are linked in the reports. In just over two months, three train routes in the Western Cape experienced massive disruptions: "five train carriages, more than 110 signals, 17 points machines, 21 track boxes and assorted cables" (01-31-2012, Metrorail fights, IOL) were either destroyed or stolen, leading to many cancellations or hours of delays

⁴ There are reports on crime and violence in and around train stations but these were not part of this analysis because they did not form part of the imaginary of the train systems under investigation here.

for commuters. The 120 incidents of vandalism in this short period had the greatest adverse effects on some of the poorest communities, Khayelitsha, Langa, and Mitchells Plain. The declining conditions of the Metrorail system, combined with acts of vandalism and sabotage, create a grid-lock – with Metrorail caught in the middle. As the pressure to deal with the problems of this system increases, the decline of the entire system also is reflected in the press:

In a joint statement, the team said Metrorail was undergoing a "very severe crisis" with its systems, rail assets and rolling stock being vandalised and sabotaged, leading to 73 train cancellations and 2 503 train delays since November last year. (02-01-2012, Plans for stranded, IOL)

Metrorail is consistently portrayed as an affordable yet ailing mode of travel for the less affluent, a means to get to and from work for people living in poor communities, such as townships or poor suburban and urban residential areas. Commuters are mostly portrayed as workers who do not have access to alternative means of transport to and from work. Examples of positive elements in Metrorail's imaginary are rare and focus mainly on a specific positive element embedded within a negative report, such as the assistance of a passenger during a crisis.

The 2012 media coverage of Metrorail can be described as a narrative on the final phase of decline of a train system, disintegrating due to external and internal reasons. At the end of 2012, Metrorail seemed to have come to an end, and an ambitious replacement system was introduced publicly. It is worth citing this new vision in detail because of its remarkable contrast and ambition, compared with the imaginary of Metrorail. It is the contrast to the current system that is particularly illustrative of the contemporary Metrorail imaginary, not only in the print media but also of the government:

Plans for a makeover of South African trains to install air conditioning, security cameras and bigger seats in all passenger coaches were unveiled on Tuesday. The state-of-the-art blue

and silver trains would become a reality in 2015, the Passenger Rail Agency of SA (Prasa) said in Johannesburg. CEO Lucky Montana said the current fleet would be replaced and all trains - commuter and long distance - would boast high level security, bigger seats, a new shape and better communication and technology. "These trains will bring comfort and the doors will close automatically. People who try and stop the doors will get hurt and there will also be no more hanging from trains," he said, describing the features. "The trains will have aircon and will have CCTVs. So those who burn trains – we will be able to catch them on camera. These trains will have a route map, so there will be a voice giving the routes. These modern trains will also have on-board communication." He said the long-distance trains would have WiFi and toilet facilities. A signalling facility would ensure that the trains braked automatically if drivers drove too fast in certain areas, if two trains were on the same track and if level crossings were not closed. Montana said the trains would be designed for people with disabilities and special needs, and would include wheelchair facilities. With 80 percent more capacity, Montana said it was hoped overcrowding would be a thing of the past in commuter trains. ... The upgrades were not limited to the trains. There would be upgrades to train stations, and sub-stations would also be replaced to ensure there was reliable electricity on the railways. During peak hours the capacity would be increased and trains would be available every three to five minutes from 2015. (12-11-2012, Prasa reveals train upgrade plan, IOL)

Interestingly, there are no newspaper articles in 2013 that deal with this new train system, and an emergency funding package of R233 million has been made available to Metrorail to fix the immediate infrastructure gaps in March 2014. In April 2014, PRASA signed a R51bn deal for the construction of more than 3 000 new trains of which the first are due to arrive at the end of 2015. Albeit less prevalent in the media, newspaper articles for the remainder of 2014 and 2015 continue to

report persistent delays and problems including, for example, defective tracks, defective sets, operational problems, technical problems, vandalism, cable theft, and so on.

The imaginary of Gautrain

The imaginary of the Blue Train is rooted in exclusivity and sensual experience, the imaginary of the Metrorail in disintegration of an affordable commuter system for mostly poor communities or commuters. Where is the Gautrain located in relation to these, and what can we learn from it, given that Gautrain is presented as South Africa's mobility system of the future?

European efficiency: When Gautrain became operational, a new imaginary took shape in South Africa's media discourse on train travel. The first of its kind, Gautrain reportedly introduced "efficient" transport, which, based on the usage of the term in the media, implies speed and practicality. In essence, Gautrain is presented as an alternative to car mobility for specific user groups in Gauteng. Media reports in 2012 presented Gautrain as a train system with standards as high as those found in developed countries, notably Europe. Here three examples:

I had the pleasure of experiencing the Gautrain from Park Station to Rosebank in a lightning speed which took less than four minutes. The Gautrain will change the face of public transport in Gauteng, and gradually make South Africa a developed country. (07-10-2012, Well done, IOL)

To commute-weary foreigners from the great capitals of the world, the underground link may seem an old hat, but it is in fact an engineering marvel designed to move passengers at a previously-unheard of rate. (04-30-2012, Fixing the Gautrain, IOL)

Everything was so clean and neat and elegant. No noise and fumes from taxis and buses. I felt like I was in Europe, everything was so different. (06-08-2012, Gautrain vs. car, IOL)

When Gautrain experienced problems sim-

ilar to Metrorail, such as overcrowding, it was framed positively and presented as evidence of its success:

Considering that this [passenger] growth (60 percent growth year on year) reflects not only a simple purchasing decision but a fundamental change in consumer behaviour, it is clear that commuter take-up has been exceptional. (10-16-2012, Parking nightmare, IOL)

Safety: Possibly the most dominant dimension of Gautrain's imaginary is that of safety, which forms an interesting contrast to how narratives on crime permeate media reports in South Africa. According to the newspaper reports, Gautrain maintains an excellent track-record in terms of passenger safety and security by not only claiming to strictly enforce rules and regulations on trains and in train stations, but by investing in regular reporting on safety measures and their effectiveness. Although enforcement of safety rules seems to conflict with travel at times, Gautrain service is presented as safe, professional, competent, and responsive to customers' needs. In contrast to Metrorail, where the presence of security personnel is presented as a necessity due to the dangers passengers are exposed to, Gautrain's considerable security measures are presented as evidence for the safety travelers experience on this train system. According to newspaper reports, Gautrain regularly conducts customer surveys and continuously implements service enhancements based on such surveys. Here an example:

A survey was conducted by Catalyst Research on passenger satisfaction [and found that] ... more than 90 percent of passengers say they are satisfied with most aspects of the operation. The findings reveal the following satisfaction levels: punctuality – 94 percent; convenience – 94 percent; value for money – 93 percent; safety and security – 92 percent; cleanliness – 92 percent... Because of the Gautrain's approach to safety and security, not one contact crime like mugging had been reported. More than 400 security guards and 800 CCTV cameras keep a watchful eye over the entire system.

Fewer than three incidents of theft per million passengers had been reported since the commencement of operations between Hatfield and Rosebank in August, but this had mainly been passengers losing items. "We have not seen any incident reports alluding to pick-pockets (and) there have been no incidents of contact crimes such as muggings," Machaka said. (04-05-2012, Gautrain is first, IOL)

An interesting extension to the safety dimension is the focus on safety for women. Because of the emphasis on high levels of safety, arguments for using Gautrain include the considerable effort to make travel for women safer than car travel. In a country where sexual crimes against women are one of the most frequent violent crimes – it is estimated that 500 000 women are raped each year, and where carjacking is a regular occurrence, Gautrain apparently provides high levels of security for a particular social group, i.e. a stratum of women in society that is relatively affluent and has regular access to a car. Here two illustrations:

"Women are a key component of our business," spokeswoman Kelebogile Machakathe said in a statement. "We remain vigilant with regards to the safety and security of our passengers on our system. If they ever feel nervous or threatened on a Gautrain they can phone our security hotline 0800-811-811." (04-03-2012, Most Gautrain, IOL)

Yvonne Sibanyoni felt women enjoyed the security. "I'm pregnant, and not having to drive is a big help." First-time Gautrain rider Kgomotso Lawal was on her way to a job interview from Bosmont Station in Pretoria. "It's very convenient. This way I don't have to deal with haphazard roads or accidents." Anthea Oliphant said she had noticed increased security at the stations. She said she felt safe using the Gautrain. (04-05-2012, Gautrain is first for women, IOL)

Efficiency, safety, and convenience combine to create a strong, positive image of the Gautrain. For commuters, university

students, shoppers, and tourists, Gautrain not only supplements car mobility for commutes between business centers, airports, universities, shopping centers, and affluent residential areas, but it also has the potential of reconfiguring how its public relates to mobility systems.

This overwhelming positivity of Gautrain is countered by two negative story threads in 2012. The first relates to construction problems of a Gautrain route that remains closed due to water seepage in a tunnel, and a second that relates to a strike by the employees of the bus company associated with Gautrain, MegaExpress, which limited Gautrain's service capacity. The newspaper articles covering the water seepage problem focused on the dispute between Bombela, the company commissioned to build the tunnel, and the South African government, who refuse to allow the tunnel to become operational until the specific contract agreements were met. As presented, the focus on the legal dispute between Bombela and the South African government implied that Gautrain is affected but not at fault for the service disruptions. In other words, in contrast to articles on Metrorail, where the media discourse internalizes problems, i.e. attaches blame to the train system even for accidents that occur when people cross tracks or when cables are stolen, here, blame is routinely attributed to external actors – contractors or the government. Gautrain is not the agent but, rather, the victim of problems that are externalized in the narratives. Here two examples of the 'water seepage scandal':

A dispute between the Bombela Concession Company, which operates the Gautrain, and the Gauteng provincial government is threatening to delay the opening of the last leg of the route between Rosebank and Park Station in the CBD. This week, a war of words erupted between the two parties after Bombela invited the media on a test run and said the trains were ready to roll; all it was waiting for was permission to start operations. It claimed the water seepage problems in the tunnel had been addressed. (04-26-2012, Fix leaks, Gautrain told, IOL)

The Gautrain route between Rosebank

and Park Station will remain closed until a revised tunnel rectification plan has been submitted and approved. ... "Bombela may be able to manage the excessive quantity of water flowing into the tunnel and provide the train services in the short term, but up to the present time it has not provided any credible assurances that the excessive amount of water will not cause irreparable harm to the tunnel itself and the environment around it in the long term," said Jensen. ... "The province cannot and will not agree to something that is clearly contrary to the long-term interest of the province and the public," she said. (05-02-2012, Water in tunnel keeps last Gautrain link closed, IOL)

The second negative story thread relates to striking Gautrain bus drivers. Similar to the water seepage scandal, these reports tend to focus on the unfolding drama around the strike and present inconveniences imposed on Gautrain and its passengers as a consequence of external forces. News stories mostly report the strike, workers' demands, union negotiations, acts of vandalism, and the intimidation of non-striking workers. Gautrain management condemns the actions of illegal strikers, terminate labor contracts of striking workers, and train replacement bus drivers. Despite these externally imposed issues, Gautrain reported maintaining skeleton services throughout this period. Here are some excerpts:

The Gautrain bus service was suspended on Wednesday afternoon due to an illegal strike by bus drivers, the Bombela Concession company said. The drivers had stopped work several times since the bus service started. Last month, drivers went on strike because they wanted MegaExpress - the Gautrain bus operating company - to provide them with daily transport from their homes to their place of work. (02-02-2012, Gautrain bus crisis damaging, IOL)

In the latest string of violent incidents involving Gautrain buses, a driver, allegedly lured into stopping for a passenger, was shot in an attack in Centurion on Monday morning. The

early-morning shooting is the latest violent incident over the past six weeks involving Gautrain buses and follows a string of threats made by striking drivers on Friday against their non-striking colleagues. The incidents - which include intimidation, arson, stonings, shootings and assaults - are thought to be linked to four illegal strikes and the dismissal of more than 300 Gautrain bus drivers. (13-03-2012, Gautrain bus strike gets ugly, IOL)

"Gautrain management is massively frustrated and extremely angry at this latest illegal industrial action on the part of bus drivers." The strike could leave thousands of commuters stranded today, but Bombela is hoping to implement "at least a skeleton service" on the busier routes as quickly as possible. (02-02-2012, Gautrain bus, IOL)

The most interesting feature about these two story threads is the tendency to focus primarily on the problematic external environment of Gautrain. Based on this imaginary, it is as if Gautrain is disconnected to its drivers and their salaries but aims nevertheless to provide safe and efficient service despite external disruptions. This discursive strategy effectively connects faulty workmanship, scheduling, industry action, etc. with the larger social and political climate of South Africa, holding the safe and efficient Europe-like Gautrain at ransom. Even though these reports are about the Gautrain, they do not present Gautrain as an active agent. Only when Gautrain responds positively to these constraints or when it resumes services is its agency restored. Thus, the positive image of Gautrain seems to remain intact despite compromising issues, in stark contrast to the media narrative on Metrorail. Gautrain seems able to side-step many of the problems in South Africa, including funding shortages and inconsistent support from an economic and political elite, while maintaining the exceptional service it provides to its customers. Here is a final excerpt that reports on the impact this rapid transport system has made in the lives of commuters:

I write this with heartfelt apprecia-

tion for the Gautrain. I have been using it to commute to the office daily. ... The privilege of interacting with fellow South Africans leaves me staggered that my car has robbed me of this opportunity. ... The Gautrain has opened doors of communication, the chance to understand my fellow South African, the chance to get some exercise in my five-minute brisk walk, the time to read my newspaper, meet new friends and has also given me priceless me-time that I wouldn't get in my car. The Gautrain is an energy-saving facet that has helped to mitigate the traffic factor that is built into the life of a "Jozillite". The Gautrain is certainly a model story of what can be achieved in our beautiful country. ... it is providing quality of life, allowing me to do more with my time with less energy. (07-05-2012, The Gautrain, IOL)

Discussion and conclusion

The introduction of Gautrain introduces car mobility options and enhances mobility for a small subsection of the population. It introduced an important mobility option within a narrow social and geographical space. In contrast, train mobility for the majority of South Africans without access to cars is constrained by the failing services Metrorail provides. When comparing the differences between these train systems, we notice how strikingly different the structural and cultural dimensions are. Kaufman, Bergman, and Joyce (2004: 750) argue that "the actual or potential capacity for spatio-social mobility may be realized differently or have different consequences across varying socio-cultural contexts." This is clearly the case with Gautrain and Metrorail.

The dimensionalities that constitute the three imaginaries as embedded in the media discourse represent radically different aspects of train mobility. Superficially, they can be positioned on a continuum, where Metrorail is considered at a dysfunctional bottom, the Gautrain, as a first-world marvel within a developing country, near the top, while the Blue Train is an exclusive and other-worldly sojourn. On closer inspection, however, the similarities between some dimensions of the Gautrain and the Blue Train are striking, as is the

distance of the Metrorail imaginary from the other two. The positivity associated with the Blue Train is uncontested within this protective and protected cocoon. The positivity associated with Gautrain is also uncontested, although its operational environment is much closer to everyday life and social problems in South Africa. The protective layer of the Gautrain is composed, on the one hand, of the support of a substratum of society that requires safe and efficient transport between business centers, upscale shopping malls and residential areas, and universities, and, on the other hand, of an agency that, within the media narrative, externalizes negative and internalizes positive forces or consequences. Presented in this way, it is the safety and efficiency of Gautrain, not the political support and funding or target group of travelers that create such pleasant experiences for travelers. And it is the externalized South African socio-economic environment that threatens to impinge on its near-flawless performance. In contrast, Metrorail cannot do anything right. It is attributed with agency such that even thefts, vandalism, or accidents are blamed on the train system. While the Blue Train does not seem to suffer from major problems, and while the Gautrain may be presented as the victim of occasional problems, Metrorail is not only at the heart, but often also presented as the cause of its problems. The implications of the partially shared imaginaries between the Blue Train, inaccessible and useless transport for most South Africans, and Gautrain, presented as the future of train travel in South Africa, are striking: For most South Africans, both are too expensive and both are inaccessible and impractical – the stations are too far away and they do not stop in the required places. Gautrain is practical in a narrow sense in that it offers a travel mode alternative to those who profit from the speedy service between business centers, malls, universities, and more affluent residential centers in Gauteng. Both are exclusive and exclusionary, and both exclude by design an infiltration of South African social problems borne by the majority of Gauteng residents. Although touted as the train system of the future, Gautrain has the potential of becoming a mobility model for the country that may integrate gated communities with gated mobility,

thus exacerbating social divisions and the potential of discontent and social conflict. The imaginary of Metrorail, in contrast, includes affordability, practicality, and access for the majority of South Africans, but it also includes a powerful underlying dimension of dysfunctionality across most mobility domains – an obsolete system at the end of its life cycle. The media narratives on the future of train travel seem steeped in social exclusion and protective privilege, away from South African social problems, while access to affordable and practical public transport is becoming a thing of the past.

The media narratives largely represent Metrorail as dysfunctional. However, our analysis revealed that Metrorail finds itself in the midst of a much larger socio-economic, historical, and political context. Towards the end of 2012, Metrorail is at the mercy of this system, even though it is usually portrayed as the agent and, thus, instigator of its problems. When we analyzed how different groups act and react in relation to Metrorail, we recognized that much of Metrorail's actions are reactive to a larger complex environment. In contrast, Gautrain seems especially adept at avoiding affiliation with mobility problems, be it strikes, union action, or services that are affected due to these and other factors (such as cable theft, electricity interruptions, etc.). When Gautrain experiences problems, its spokespersons or the journalists themselves deflect blame effectively to ensure a well-crafted positive imaginary. The introduction of Gautrain and its coverage in the media emphasizes the deficiencies of the declining Metrorail system. It appears most likely that the parallel systems will continue to coexist: an affordable but dilapidated Metrorail system that is barely nursed along with successive emergency funding, and a modern, efficient, and "safe" system associated with restricted access and usefulness. In association with spatial segregation of work and living spaces, "modern", "efficient", and "safe" may become a euphemism for systemic socio-spatial exclusions of poor, especially non-white South Africans. Gautrain may become a safe tunnel that whisks commuters, shoppers, students, and tourists to safe destinations.

This system seems to continuously reify itself. Positive and negative cues seem to reinforce a positive and negative imaginary. To this end the potential to be mobile seems to play a significant role and can be used to explain much of the difference between Metrorail and Gautrain. The more empowered passengers complain, withdraw, or otherwise affect mobility policy options – more likely with Gautrain customers – the higher their potential to co-construct a mobility system that caters for their needs, and the more they will invest and integrate this option into their mobility needs. Gautrain must be responsive to the needs of its customers, and it must deliver high quality and responsive service. Due to a lack of mobility options and the relative inability to complain effectively, the action potential of Metrorail passengers is limited. While some exercise their agency by complaining, marching, or vandalizing, the majority of its customers remain at the mercy of political decision makers who, themselves, seem to be unsure about the future of Metrorail. It appears that the future of train mobility in South Africa will continue to be spatially and socially divided, and that train mobility will make important contributions toward this division. Differential spatial positions and mobility needs will exacerbate social divisions, while social divisions will reify differential spatial access and mobility options.

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Effects of Residential Land Use on Trip Generation in Urban Areas: Comparison between Estimated Trip Generation Rates and Planning Practices in Dar es Salaam, Tanzania.

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1.0 Introduction

Trip generation rates are useful components in urban transportation planning. In this study, models were developed to depict the difference between vehicle trip generation rates provided in Urban Land use and Transportation Planning Manual (ULTPM) and actual rates of vehicle trips generated in the study areas. The primary concern was determining the extent land use change affects trip generation rates, which are used in estimating travel in urban planned areas, and proposing the mechanisms of minimizing those effects. Land use is described in terms of physical plots, parcels, houses or dwellings and their associated social economic characteristics. Land use change is therefore presented in spatial dimensions regarding changes in location and size of living and working areas, and associated social economic characteristics. All urban land uses, including residential, commercial, institutions, industrial and open spaces, are important in trip generation, but due to time constraints, this study focused on residential land uses, specifically vehicle trips generated in detached, semi-detached, terraced and apartment dwelling categories.

A number of studies have described the causal relationships between the changes in land use and trip generation. Consequently, correlations between land use variables and trip generation have been established. However, it is still not clear to what extent the change of land use affects trip generation rates in planned urban areas. This knowledge gap has made it difficult for decision makers, planners and policy makers to effectively implement changes in land use policies without affecting transportation demand.

The objectives of this study are therefore :

- (i) to examine the effects of changes in land use on trip generation rates used

by local practitioners for different residential land uses;

- (ii) to develop methodology for deriving trip generation rates for different residential land uses in the study area;
- (iii) to compare trip generation rates provided in land use planning manuals and rates obtained in the study area;
- (iv) identify factors planners and policy makers should consider in order to reduce the effects of land use changes upon transportation urban areas.

This study adopted a case study approach; 304 households within the study area were surveyed and regression models were used to determine number of vehicle trips generated per household per day. The model coefficients and values of independent variables were used to determine vehicle trips generated for work, school, shopping and recreation purposes. Then, trip generation rates for each purpose were aggregated in order to determine vehicle trips generated in detached, semi-detached, terraced and apartment dwelling categories.

The process of determining vehicle trips generated by household per day was accomplished in two main steps. The first step included determining the values of household characteristic variables (independent) applied in the model. The values were determined by summing up the total number of observations for each variable divided by the number of surveyed households in each respective dwelling category. In order to determine the number of vehicle trips generated by the household, each value was multiplied by its respective model coefficient. At this point in the process, sixteen categories of vehicle trip rates were determined. It included vehicle trips generated in each dwelling category (detached, semi-detached, terraced and apartment) for work, school, shopping and recreation purposes. The second step consisted of aggregating the trip generation rates across purposes within each dwelling category. The obtained trip rates are for vehicle trips generated in detached, semi-detached, terraced and apartment dwellings per household per day.

The comparison between vehicle trip rates obtained in the study area and rates provided in Urban Land Use and Transporta-

tion Planning Manual (ULTPM) were also divided into two parts. First, the values of household characteristics (independent) obtained in study area and values provided in ULTP manual were compared. The manual values were much lower than those within the study area. Next, the vehicle trip generation rates provided in the ULTP manual were compared to the rates obtained in the study area. Within the study area, additional vehicle trips (individual households per day) were noted in detached, terraced and apartment dwellings, while fewer trips were observed in semi-detached dwellings.

The rate of change in household characteristic variables and trip generation rates analyzed in this study prompt questions regarding the application of manual rates in estimating and forecasting transport demand. Therefore, this study suggests transport planners to carry out site or city specific travel analysis and determinations of vehicle trip rates. When an in-depth analysis is not possible, in order to determine if the transfer or borrowing of trip rates is appropriate, a comparative analysis of the household characteristics between the study area and sites or cities examined in developing manual standards is highly recommended.

2.0 Literature review

The process of estimating trip rates includes determination of the actual amount of travel in the region or specific zone, which is functionally related to land use distributions. The estimate of trip rates is described in terms of character, intensity and location of activities. Factors influencing the amount of travel in the planned area include automobile ownership, income, household size, density and type of developments, and availability of transportation infrastructures. The purpose of trip estimation is to determine the number of trips per person or trips per land parcel. Person trips estimates are based on population projection data from residential dwellings and household sizes whereby number of vehicle trips are estimated to every individual person per day, while trips per parcel are based on functions of land parcels and sizes in terms of ground areas or floor areas (Kitamura et al., 2006). Trip

estimates are categorized into three major groups:

(i) Site-specific impact analysis for assessing the effects of new developments together with vehicle trips expected to be generated by the proposed development.

(ii) Short and long term development alternatives for evaluation of transportation needs in specific urban areas.

(iii) Long term development plans that consider vehicle trips generated by different types of developments in the country or entire region.

This review has concentrated on item number two, but specifically for vehicle trip rates generated in urban residential development areas which are most vulnerable to changes in land use.

Residential trip generation rates are a fundamental component of transportation planning. Miller et al., (2012) conducted household surveys in four residential neighbourhoods in order to determine trip generation rates of individual households in the neighbourhoods. Obtained rates were compared with the national trip generation rates provided in the manual by the Institute of Transportation Engineers (ITE). Generally, rates obtained in the study area were different from the manual rates. Single-family detached homes indicated slight differences between site-specific household surveys and ITE's trip generation rates. However, rates were significantly different for apartment dwellings. A summary of differences in vehicle trip rates between ITE and observed trip rates are not a source of frustration for transportation planners, rather, they illustrate the need for determining self-controlled, site-specific rates. Even when equivalent methods for determining rates are used for similar neighbourhoods, differences will occur because of the large and random variation inherent in trip generation. Borrowing rates from ITE or other sources may indeed be tolerable, but only if one provides the full range of possible rates, which is probabilistic rather than just the expected mean rate, which is a measurement prone to uncertainty and biases.

Ellys and Reid (2009) cautioned against the use of ITE trip generation rates in cit-

ies of developing countries. The study addressed changing land use patterns and the informal development of these cities. The authors suggested that the ITE trip rates, referred to as ‘‘borrowed rates’’, are best applied when analysts consider whether the rates can be modified in order to fit the proposed application. The growth and travel patterns of cities in developing countries are different than those in developed countries. As evidenced by the change of residential detached houses to multi-story business complexes or hotels in developing countries, equivalent changes is very rare in developed countries. Therefore, the practical application of borrowed rates in cities of developing countries requires precaution.

In the NCHRP-National Cooperation Highway Research Program, Williams et al., (2006) deliberates various techniques for determining parameters for trip generation, whether site-specific vehicle trip rates, or household vehicle trip production rates. According to Williams, determining site-specific vehicle trip rates requires identifying major land use categories and the number of trips produced or attracted at each category. Table 1 details the vehicle trip data that should be collected in order to ascribe to best practice.

On the other hand, Filitowish (2011) showed household trip production rates obtained by collecting data on the ground or floor area of a specific housing unit. Other data collected includes gender, age, number of household employee, number of vehicles owned in the household, number of school going children and children not going to school, number of licensed drivers in the household and annual household income.

Totems and Darks (2009) insisted on developing site-specific trip rates rather than adopting the rates developed at different locations for general applications. The study assessed the limitations for model and trip rates transferability, the major recommendations were to avoid unbranded assumptions that travel estimation factors are universal and therefore travel requirements are the same for all cities worldwide. Due to the unique characteristics of city travel patterns, the authors conclude that travel estimation and forecasting should make use of site or city specific trip rates.

The Institute of Traffic Engineers (ITE) (2012), provides the second set of trip generation rates. The rates were derived from

Land use	Vehicle trips	Land use	Vehicle trips	Land use	Vehicle trips
Residential: Vehicle trips per household/dwelling unit per day					
Detached	9.55	Semi-detached	9.55	Block flats and terraced	6.45
Other land uses: Vehicle trips per square meter per day					
Office	0.12	Park	0.14	Schools	0.11
Retail shop	0.7	Bus terminal	0.12	Collage/university	0.12
Bank	1.4	Religious	0.32	Health	0.23
Bank	0.96	Hall	0.11	Medical services	0.34
Shopping Centre/market	0.3	Open space/recreation	0.013	Reserved/conserved area	0
Service station	1.5	Sport ground	0.37	Bar & restaurant	0.08
Business park	0.14	Service/light industry	0.06	Manufacturing/heavy industry	0.03

Table 1: Vehicle Trip Rates in Different Land Use Categories

Source: Urban Land use and Transport Planning Manual 1982 revised on 2008

household survey data and traffic survey inventories. Generally, the ITE trip generation rates for various land use categories in Tanzania are also documented in the Urban Land Use and Transportation Planning Manual (ULTPM, 2008); these values are presented in Table 1. The manual trip rates are categorized into residential and non-residential land uses. The rates for residential land uses are the number of vehicle trips generated by individual households or dwelling units per day, whereas, rates for non-residential land uses include number of vehicle trips generated by the unit measures of the ground or floor area per day. Residential uses are categorized into detached, semi-detached, terraced and apartment, while non-residential include land use for commercial, institution, industrial, open spaces and recreational facilities.

Filitowish (2011) and TiIsdor (2012) described the shortcomings of applying manual trip rates in Tanzania and other developing cities for urban transportation planning as follows:

- Rapid increases of population in urban planned areas resulted from high rates of urbanization. Commonly, population is the most important aspect in calibrating trip generation rates. Therefore, increases in urban population ultimately affect trip rates.
- Emergence of formal and informal land use changes do not go in hand with the provision of transportation infrastructure.
- Accommodating multi-family units within the single family house. This situation is mainly caused by high rates of housing demand and lack of housing stocks in urban areas whereby two or more households can be accom-



Figure 1: Land Use in Year 1992

modated in one house or dwelling unit.

- Long travel distances to work that necessitate reliance upon automobile transportation to the urban centre. This is mainly caused by a high percentage of employment opportunities being located far away from residential neighbourhoods (Berry 2003).

3. 0 Selection of Study Area and Data Collection

The study was conducted in the city of Dar es Salaam, which is the largest city in Tanzania and is located in the eastern part of the country along the shore of the Indian Ocean. The study area was selected because it has been planned and developed for more than twenty years, it cov-

ers three or more neighbourhoods, and has undergone rapid land use change. Three categories of data were collected in the study area; the first category was land use change characteristics, the second was socioeconomic data and the third was travel attribute data. Land use change data was obtained by using land use plans, which were digitized in Arc GIS software and updated with satellite imagery from 2012 (Figures 1 and 2). The differences between planned and existing land uses were obtained through overlay functions, and verified physically by researchers moving throughout the study area using GPS receivers.

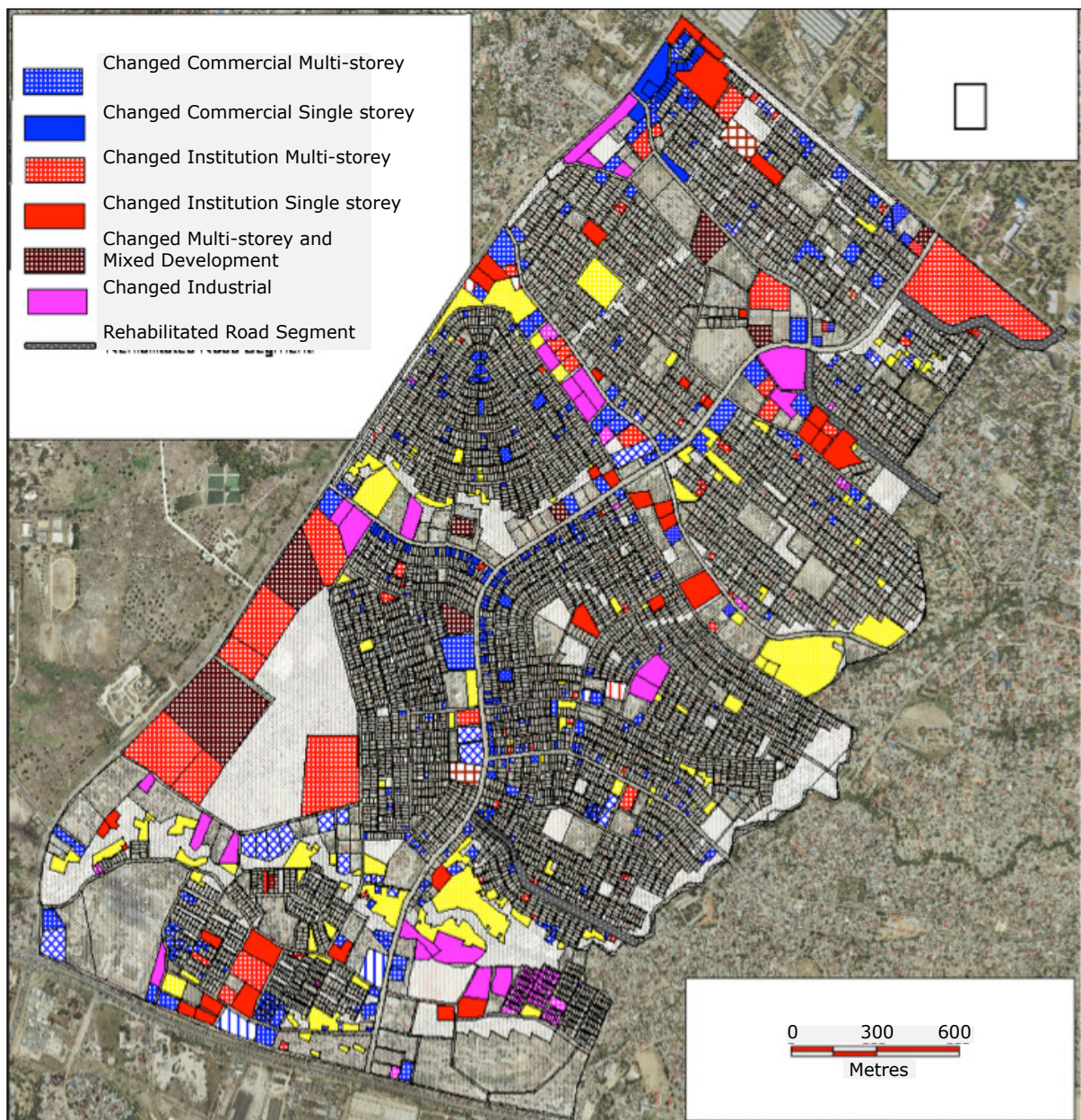


Figure 2: Land Use in Year 2012

Household surveys were used to collect social, economic, and travel attribute data in the study area. The survey process consisted of three steps. First, random sampling was used to determine the appropriate number of respondents in the study area. The responding population was the total number of houses or dwelling units (6743 houses). The sample size (377 houses) was determined using the formula $n=N/(1+N(e)^2)$, where n is the sample size, N is total number of houses (the population), and e is the level of precision (0.05 at 95% confidence level) (Glenn 1992). A uniform of 1 house out of 18 houses or dwelling units was selected as part of the sample population.

The second step was to select interview households. The interview was completed for one household in the sampled house or dwelling unit because most of sampled houses or dwelling units contained two or more households. The process includes interviewers physically visiting the sampled house and interviewing one member of the selected household. Interviews were conducted on weekend days in order to find adults at home, but questions were asked regarding the travels made on 'one' of the previous working days. 304 households, or 81% of the sample size, were interviewed. Primary reasons for achieving less than 100% of the sample size include inaccessibility of sampled houses and unavailability or unwillingness of interviewees.

The third and final step in the data collection process was carried out at the individual and household levels. At the individual level, the interviewee was required to state the trips chain¹ made for the previous working day. For each trip, the provided data included start and end times, origin and destination locations, purpose, mode of transportation used, and distance travelled. At the household level, the interviewees were required to provide data for household characteristics and travels made by each member of the household. Household characteristic data included household size, Number of employee, vehicle ownership, children of pre-school and

¹ Trips were counted as going (for work, school, shopping and recreation) is one trip and coming back is another trip. For the intermediated destinations one trip was counted for each intermediate destination.

school age, adults, and licensed annual income. Household travel data included the time each member started the first trip from home, the time back home, purposes of travels, and types of transportation used.

4.0 Land Use change in Tanzania

Land use Change is legally accepted and formally practiced in urban planning in Tanzania. The Urban Planning Act of 2007, Section 30-38 states that any person being a land holder of a granted right of occupancy who intends to change the use of land or building on that land shall take action in accordance with the provisions of the Act. Application of planning consent for change of use has to be submitted to the planning authority or to the director of the planning authority in the form and manner prescribed by regulations made under the Act. The planning authority is then required to make assessments on the proposed developments based on the planning space standards, building functions, heights, appearances, and arrangement of buildings. The director of the planning authority is required to accept the application and approve the proposed development subject to changes in the use of land or building and certify the proposal implementation.

In the study area, the changes were obtained by overlaying the planned 1992 land use map layers to the 2002 land use map layer. Current land uses were obtained from high-resolution satellite images for 2012. Through overlay operations the spatial differences for the ground area (GA) and floor area (FA) of each land use category were determined. GA was obtained by computing the area of land parcels for each land use category, and FA was obtained by measuring the sizes of the buildings and counting the number of stories. In order to avoid duplicating the computed areas, the GA was removed from the counted FAs in each multi-story building. The spatial differences between planned areas in 1992 and existing land uses in 2002 are presented in Table 2 below.

As indicated in Table 2, some residential land parcels changed to other land uses, and the addition of multi-story buildings

Land use category	Planned land use 1992	Land use on 2002	Change Difference	
	Area (m2)	Area (m2)	Area (m2)	Percentage
Residential				
Ground area	3,310,000	3,146,000	-164,000	-5.0%
Floor Area	223,000	263,140	40,140	18.0%
Commercial				
Ground area	236,180	724,478	488,298	206.8%
Floor Area	128,558	668,301	539,743	419.8%
Institution				
Ground area	567,377	894,991	327,614	57.7%
Floor Area	64,100	467,987	403,887	630%
Industrial				
Ground area	76,432	230,200	153,768	201.1%
Floor Area	0	0	0	0%
Open space				
Ground area	1,806,041	988,000	-818,041	-82.9%
Roads				
Ground area	1,161,100	1,173,360	12,360	0.17%

Table 2: Land Use Change Distribution

1. Residential, commercial and institution land uses include both ground and floor area with various multi-storey buildings; while industrial, open spaces and roads land uses are ground areas which do not include vertical or multi-storey developments.
2. Change difference (percentages) was computed and presented for each specific land use category.

for residential purposes is insignificant. Commercial and institutional land uses, however, increased considerably. Most notably, open spaces were converted to commercial and institutional multi-story buildings. Most of the altered parcels were used for hotels, shopping centres and retails, schools, churches, mosque, health and offices for public services. Changes in industrial land use are mostly to accommodate garages, parking yards and service industries.

The aforementioned land use changes obviously increase the travel demand within the planned area and necessitate the improvement of existing roads or the construction of new transportation infrastructures. However, the shortage of land for expansion, project costs, and government priorities limit transportation infrastructure improvement projects.

5.0 The Model Formulation

Models were formulated in bivariate structure and based on household survey data. The salient characteristic of this structure is that the determined or dependent variables are defined by independent variables in linear form. The number of vehicle trips generated by the household for a specific purpose was expressed by the linear function of independent variables. In addition, models also included variables that specify the dwelling categories where trips were originated. Therefore models were defined as follows:

$$Y_{im} = \alpha_{0m} + \alpha_{1m}X_{i1} + \dots + \alpha_{9m}X_{i9} + \beta_{1m}D_{i1} + \dots + \beta_{4m}D_{i4} + \xi_{jm}$$

Where:

Y_{im} = Number of vehicle trips made by individual household i for purpose m

α_{0m} = Constant coefficient for purpose m

α_{km} = The associated coefficient of household characteristic variable k for purpose m

β_{jm} = The associated coefficient of

dummy variable j for purpose m
 X_{ik} = Value of characteristic variable k
for household i
 D_{ij} = Dummy variable: 1 if household i
is living in dwelling category j , 0 otherwise
 ξ_{jm} = A random error term of household
 i for purpose m

Vehicle trips as applied in this model encompass trips made by individual household by using private cars, public buses (well-known Daladala), taxis, workplace or office vehicles and school buses. They exclude trip made by using regional or up-country buses, trucks and freight vehicles.

5.1 Variables

Both dependent and independent variables are shown in table 3. Dependent variables include vehicle trips made by individual households for the purposes of work, school, shopping and recreation.

Vehicle trips for work were trips made by household employees to and from work or any work related journey performed from one workplace to another. Vehicle trips for school include vehicle trips to and from schools made by school children on their own, and all vehicle trips made by the parents when driving their children to and from the school. Shopping trips include vehicle trips made for all domestic purchases and non-work but related business trips, while recreation vehicle trips encompass vehicle trips made for visiting relatives, health, worship and other social activities.

Explanatory variables are variables that describe household characteristics. Such variables include household size, household employment (government, private and self employed), household annual income (low, medium and high income), age (pre-school, school age and adult going to school and college), household ve-

Variable	Definition
Dependent variables (Y_{im})	
WBT	Vehicle trips for work
SBT	Vehicle trips for school
ShBT	Vehicle trips for shopping
RBT	Vehicle trips for recreation
Independent variables - Household characteristics (X_{ik})	
NPHH	Number of people in the household (household size)
EmpHH	Number employees in the household
ANEmpHH	Number of adults in the household who are not employed
VOHH	Number of vehicles owned by the household
LDHH	Number of licensed drivers in the household
PSchHH	Number of pre-school children in the household (between 0-5 years)
SchHH	Number of children of school age in the household (between 6-18 years)
AHH	Number of adults in the household going to high school and college (19 years and above)
AIHH	Household annual income (in Tanzanian Shillings)
Independent variables - Dwelling categories (D_{ij})	
VTODH	1-if the household lives in a detached dwelling, 0 otherwise
VTOSDH	1-if the household lives in a semi-detached dwelling, 0 otherwise
VTOTH	1-if the household lives in a terraced dwelling, 0 otherwise
VTOAH	1-if the household lives in an apartment dwelling, 0 otherwise

Table 3: Specification of the Variables in the Vehicle Trip Generation Models

hicle ownerships and licensed drivers. In addition, there are also dummy variables characterising the dwelling category of the household such as detached, semi-detached, terraced or apartment dwelling.

5.2 Model Estimation Results

All models were estimated by using Ordinary Least Squares (OLS) regression procedures. Coefficients were determined for the work, school, shopping and recreation trips, and the dummy variable for detached, semi-detached, terraced and apartment dwelling categories. The R^2 (R-square) value determines the percentage of total variance that is explained by the predictor variables in the model. The higher the R^2 value the less error in the model and therefore the better the model prediction. The t-test is applied as a measure of Perceived Functional Ability (PFA) of the predictor variables. Each predictor variable is measured within a 95 percent confidence level at p -value $\leq .05$.

5.2.1 Trip Generation Model for Work

The final model for daily vehicle trips generated by the household for work purposes is shown in Table 4. The independent variables can reliably explain and predict the dependent variable at 57.6% ($R^2 = 0.576$). All independent household characteristic variables included in the final model are positively associated with the dependent variable and the coefficients

are significant at p -value ≤ 0.05 . The estimated model coefficients imply that the number of vehicles for work purposes is positively correlated with the household size, number of employees, number of vehicles and number of licensed drivers in the household.

The model has also been tested for the dummy variables related to the dwelling category of the household. The results show that households living in detached dwellings have significantly lower work trip rates whereas households living in apartment dwellings have significantly higher work trip rates than those living in other dwelling categories.

5.2.2 Trip Generation Model for School

The final model for daily vehicle trips generated by the household for school purposes is shown in Table 5. The independent variables can reliably explain and predict the dependent variable at 28.7% ($R^2 = 0.287$). All independent household characteristic variables included in the final model are positively associated with the dependent variable and the coefficients are significant at p -value ≤ 0.05 . The model coefficients imply that, the number of vehicle trips generated for school purposes are positively correlated with number of children of school age, number of adults going to school and collages and number of vehicles in the household. The model has also been tested for the dummy varia-

Variable	Alfa/beta	Std error	t-statistics	Significance
NPHH	0.226	0.048	4.790	0.000*
EmpHH	1.187	0.207	5.795	0.000*
VOHH	0.268	0.124	2.179	0.030*
LDHH	0.304	0.123	2.532	0.012*
VTODH (Dummy)	-0.848	0.324	-2.614	0.009*
VTOAH (Dummy)	1.315	0.184	3.425	0.001*
Constant	0.490	0.134	2.128	0.046*
R^2	0.576			
F	80.849			
N	304			

Table 4: Trip Generation Model –Vehicle Trips for Work

Alfa/beta: Estimated model coefficients;

* Significant at p -value ≤ 0.05

bles related to the dwelling category of the household. The results show that households living in apartments, semi-detached and terraced dwellings have significantly and increasingly higher school trip rates than those living in detached dwellings.

characteristic variables included in the final model are positively associated with dependent variables and the coefficients are significant at $p\text{-value} \leq 0.05$. The model coefficients imply that, the number of vehicle trips generated for shopping

Variable	Alfa/beta	Std error	t-statistics	Significance
SchHH	0.462	0.062	7.483	0.000*
AHH	0.191	0.034	5.582	0.000*
VOHH	0.148	0.068	2.167	0.031*
VTOSDH (Dummy)	0.548	0.235	2.335	0.020*
VTOTH (Dummy)	1.215	0.386	3.146	0.002*
VTOAH (Dummy)	0.362	0.174	2.086	0.038*
Constant	-0.687	0.171	-4.026	0.000*
R ²	0.287			
F	20.142			
N	304			

Table 5: Trip Generation Model –Vehicle Trips for School

Alfa/beta: Estimated model coefficients;

* Significant at $p\text{-value} \leq 0.05$

5.2.3 Trip Generation Model for Shopping

The final model for daily vehicle trips generated by the household for shopping purposes is shown in Table 6. The independent variables can reliably explain and predict the dependent variable at 41.0% ($R^2 = 0.410$). All independent household

purposes is positively correlated with the household size, employee, annual income and vehicle owned in the household.

The model has also been tested for the dummy variables related to the dwelling category of the household. The results show that households in detached and semi-detached dwellings have significant-

Variable	Alfa/beta	Std error	t-statistics	Significance
NPHH	0.108	0.040	2.698	0.007*
EmpHH	0.770	0.168	4.576	0.000*
AIHH	0.044	0.011	3.962	0.000*
VOHH	0.312	0.123	2.537	0.012*
VTODH (Dummy)	1.243	0.629	1.974	0.049*
VTOSDH (Dummy)	1.759	0.728	2.416	0.016*
VTOAH (Dummy)	-1.411	0.672	-2.100	0.037*
Constant	-1.415	0.709	-1.995	0.047*
R ²	0.410			
F	29.359			
N	304			

Table 6: Trip Generation Model –Vehicle Trips for Shopping

Alfa/beta: Estimated model coefficients;

* Significant at $p\text{-value} \leq 0.05$

ly and increasingly higher shopping trip rates, whereas those living in apartments have significantly lower shopping trip rates than those living in terraced dwellings.

5.2.4 Trip Generation Model for Recreation

The final model for daily vehicle trips generated by the household for recreation purposes is shown in Table 7. The independent variables can reliably explain and predict the dependent variable at 33.2% ($R^2 = 0.332$). All independent household

Variable	Alfa/beta	Std error	t-statistics	Significance
NPHH	0.424	0.089	4.783	0.000*
EmpHH	-0.269	0.136	-1.989	0.048*
ANEmpHH	0.407	0.154	2.641	0.009*
VOHH	0.639	0.171	3.745	0.000*
VTODH (Dummy)	1.741	0.692	2.514	0.012*
VTOTH (Dummy)	3.134	1.325	2.365	0.019*
VTOAH (Dummy)	1.909	0.816	2.339	0.020*
Constant	-1.970	0.785	-2.508	0.013*
R^2	0.332			
F	22.150			

Table 7: Trip Generation Model –Vehicle Trips for Recreation

Alfa/beta: Estimated model coefficients;

* Significant at p-value ≤ 0.05

characteristic variables included in the final model are positively associated with the dependent variable and the coefficients are significant at p-value ≤ 0.05 . The model coefficients imply that, the number of vehicle trips generated for recreation purposes is positively correlated with the household size, number of unemployed people, and number of vehicles in the household, whereas it is negatively correlated with the number of employees in the household. An interpretation of the latter result is that as more people within a household are employed, less free time is available to engage in leisure and social activities.

The model has also been tested for the dummy variables related to the dwelling category of the household. The results show that households living in detached, apartment and terraced dwellings have significantly and increasingly higher recreation trip rates than those living in semi-detached dwellings.

6.0 Values of Independent Variables

After having estimated the model coefficients, we determined the average values of the independent variables to be applied for estimating trip generation rates. This requires aggregating the household characteristic data collected during the household surveys. Values for each variable were aggregated and averaged separately for each dwelling category. The values are presented in Table 8 (p43).

7.0 Estimation of Vehicle Trip Rates

The estimated model coefficients and the average values of the independent variables were used to determine household vehicle trip rates for each trip purpose across dwelling categories, sixteen categories in total. The detailed calculations are shown in Appendix 3-6.

Table 9 (p43) displays the rates of vehicle trips generated by the household per day according to the estimated models and average values of the independent variables. There are some variations between the dwelling categories. The work and school trip rates are highest among households living in apartments. The shopping and recreation trip rates are highest among households living in detached dwellings. The total trip rates across all trip purposes are highest for households living in detached dwellings, followed by apartment dwellings, next by terraced dwellings, and finally, by semi-detached dwellings.

Independent variable	Average Value			
	Dwelling category			
	Detached	Semi-detached	Terraced	Apartment
Household size	6.36	5.65	5.63	5.34
Pre-school age (between 1-5 years)	1.07	0.85	0.63	0.89
School age (between 5-18 years)	1.38	1.25	1.63	1.13
Adult age (19 years and above)	3.92	3.55	3.45	3.34
Household employees	1.67	1.50	1.53	1.82
Non employed adults	2.24	1.75	1.81	1.68
Annual household income (Millions Tanzania Shillings)	25.16	22.17	20.85	25.02
Household vehicle ownership	1.14	0.95	0.91	1.21
Household licensed drivers	1.44	0.75	1.54	1.61

Table 8: Values for Independent Household Characteristics Variables

Dwelling Category	Vehicle Trips - Purpose				Vehicle Trip Rate
	Work	School	Shopping	Recreation	
Detached	4.59	1.42	3.38	4.66	14.04
Semi-detached	4.02	1.02	3.27	2.45	10.76
Terraced	3.81	1.01	1.57	3.46	9.85
Apartment	5.99	2.08	1.63	3.25	12.94

Table 9: Estimated Vehicle Trips per Household per Day

8.0 Discussion of the Results

The trip generation rates obtained in this study are obviously a consequence of the impacts of land use changes that have occurred on the planned residential areas. In fact, the total vehicle trip rate is highest for households living in detached dwellings and slightly lower for those living in apartment dwellings. This is partially contrary to the pattern observed in cities in developed countries where vehicle trip generation rates usually are higher for households living in detached and semi-detached dwellings as compared to these rates for households living in terraced and apartment

dwellings. This observation is also partially contrary to the standard values provided in the Urban Planning Guidelines (2007) in Tanzania. The Guidelines suggest high rates of vehicle trips for households in detached and semi-detached dwellings, and lower rates for households in terraced and apartment dwellings. The difference is mainly caused by the change of lifestyle in urban planned areas, whereby a great percentage of high and middle income households live in apartment dwellings and the majority low income households

and unemployed people live in detached and semi-detached houses. The study also found the number of employees and ve-

hicles were higher for households living in apartment dwellings. This contributes to higher vehicle trip rates for household living in apartments compared to those in semi-detached and terraced dwellings.

Another notable result is the relationship between household income and number of employed individuals, and vehicle trip rates for work and recreation. The results show that the households or dwelling units that have higher annual income and number of employees also have higher vehicle trips rates for work, but low vehicle trip rates for recreation. The households or dwelling units with lower annual income and numbers of employees also have low vehicle trip rates for work, but higher vehicle trip rates for recreation. This observation supports the notion that if individual households spend more time on work and other development activities, they use less time for social and leisure activities, and therefore will generate fewer trips for recreation. Although most recreation trips were generated by unemployed members of households, but this statement is still valid. However, further investigations are recommended in order to determine the relationship between social travels and household employment.

Variations were also observed in school trip rates generated in detached, semi-detached and apartment dwellings. Despite more school-age children present in detached and semi-detached dwellings, vehicle trip rates for school are higher in apartment dwelling. This situation is probably influenced by the location of schools in relation to dwelling categories. In most cases, schools are located near detached and semi-detached dwellings (at a maximum of 1 kilometre working distance) but a bit far from apartment dwellings. Location therefore greatly influences the use of private cars and public transportation for school related journeys for households located far away from schools. Also household vehicle ownership, number of employees and annual income impacts vehicle trip rates for school; as these categories rises school-related trip rates. As the number of employed individuals and income increases, households are able to afford school bus fees that contribute to vehicle trip rates for school.

Shopping vehicle trips rates are quite different from school and work. More trips for shopping purposes are generated in detached and semi-detached dwellings and minimized in apartment dwellings, while trips generated for work are maximized in apartments and minimized in detached and semi-detached dwellings. Fewer shopping trips originating from apartment dwellings is probably caused by the close proximity of local markets and shopping centres - most apartment dwellers tend to walk for shopping activities. In most cases detached and semi-detached dwellers use public transportation for shopping activities.

Recreation vehicle trip rates are greatly affected by the employment status. As discussed earlier, recreation vehicle trips are negatively associated with increasing number of household employees, but positively associated with unemployed adults. As presented in model results, household living in apartments have high rates of employment and low rates of unemployed adults that result to low vehicle trip rates for recreation purposes. On the other hand, households living in detached dwelling have low rates of employment and high rate of unemployed adults, therefore have high vehicle trip rates for recreation purpose.

9.0 Comparison

This section presents a comparison between values obtained in this study area and those provided in the Urban Land Use and Transportation Planning Manual (ULTPM). The comparison is divided into two parts: the first concerns the values of household characteristic variables applied in the model, and the second concerns the estimated vehicle trip generation rates. The household characteristic values used in the ULTP manual were obtained from datasets applied in ITE Trip Generation Manual 4th Edition (for details we refer to Filitowish, 2011), while the values applied in this study were obtained from the data collected in the study area.

Table 10 presents the differences between the values of household characteristics provided in the ULTP manual and the values observed in the study area. The differ-

Household Characteristics	Manual vs. Study Area	Values in Dwelling Categories			
		Detached	Semi-detached	Terraced	Apartment
Household size	ULTP manual	5.00	5.00	4.00	4.00
	Study area	6.36	5.65	5.63	5.34
Vehicle ownership	ULTP manual	0.75	0.75	0.50	0.50
	Study area	1.14	0.95	0.91	1.21
Licensed driver	ULTP manual	0.75	0.75	0.50	0.50
	Study area	1.44	0.75	1.54	1.61
Employment	ULTP manual	1.00	1.00	0.75	0.75
	Study area	1.67	1.50	1.53	1.82
Annual income (mil Tshs)	ULTP manual	12.50	12.50	7.50	7.50
	Study area	25.16	22.17	20.85	25.02
Households or families in the house	ULTP manual	1.00	1.00	1.00	1.00
	Study area	2.92	2.50	1.6	1.5

Table 10: Comparison of Household Characteristics Values

ences are of three kinds: Firstly, the manual has the same values for detached and semi-detached dwellings, and for terraced and apartment dwellings. It is not realistic to apply the same values in different dwelling categories in urban planning practice (Ellys and Reid 1982). In contrast, the estimated values are different for dwelling categories as observed in the study area. Secondly, in the manual all variables assume higher values in detached and semi-detached dwelling categories, and lower values in terraced and apartment dwellings. However, in the study area rates vary based on household characteristic values. In some cases rates in detached dwellings are higher, in other cases rates are higher in apartment dwellings. Lastly, the values in the manual are consistently lower compared to those estimated in the study area. The number of vehicles, number of licensed drivers, number of employees and annual income are almost consistently much higher in the study area. This is probably an effect of land use changes

in the study area and general economic trends, which have resulted in a large change of household characteristics in the study area.

The comparisons between vehicle trip generation rates provided in the ULTP manual and rates found in the study are presented in Table 11. The rates in the study area are 100 percent higher for households living in apartment dwellings and about 50 percent higher for households in detached, semi detached and terraced dwellings. The dramatic difference in trip generation rates for apartment dwellings can be partially explained by changes in household characteristics which probably are caused by land use change.

Dwelling category	Vehicle trip generation rates		Difference in trip rates	Difference in percentages
	ULTP manual	Study area		
Detached	9.55	14.04	4.49	47.0
Semi-detached	9.55	10.76	1.21	10.2
Terraced	6.45	9.85	3.40	52.7
Apartment	6.45	12.94	6.49	100.62

Table 11: Comparison of Trip Generation Rates

10.0 Conclusion and Recommendations

10.1 Conclusion

Trip generation rates obtained in different residential dwelling categories have depicted the inconsistency of using manual trip rates in estimating and forecasting travel demand. The differences between the trip generation rates obtained within the study area and the rates provided in ULTPM are quite large, and therefore, the validity of the manual must be questioned. As indicated in the study area, the observed differences are perhaps caused by change of land uses, economy, lifestyles and other household characteristics that influence the number of vehicle trips generated by individual households per day.

10.2 Recommendations

In order to minimize effects of using disadvantaged manual rates in transportation planning, we recommend planners carry out an empirical study for the specific city or site with the goal of determining city or site specific vehicle trip rates. In the case of transferability or borrowing of trip generation rates, a comparative analysis between sites where trip rates were obtained and sites to be applied should be done before using the borrowed rates in transportation planning.

It is also important to consider how often trip generation rates need to be reviewed. The standards in the Urban Land Use and Transport Planning Manual developed in 1982 were reviewed in 2008. With such a large time gap between rate development and review, the rates were too old to be able to cope with the changes presented in fast-growing cities. Therefore, this study recommends a maximum of five years between reviews of trip generation rates.

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Appendix 1: Values of Household Characteristics Variables

	HH Size	Pre-School Age	School Age	Adult Age	HH Employee	Non Employed	Income Millions	HH Vehicle Ownership	HH Licensed Driver
Detached									
Surveyed household	234	234	234	234	234	234	234	234	234
Total observation	1489	252	317	919	391	525	5889.6	267	339
Average	6.36	1.07	1.38	3.92	1.67	2.24	25.16	1.14	1.44
Semi-Detached									
Surveyed household	20	20	20	20	20	20	20	20	20
Total observation	113	17	25	71	36	35	443.4	19	15
Average	5.65	0.85	1.25	3.55	1.5	1.75	22.17	0.95	0.75
Terraced									
Surveyed household	7	7	7	7	7	7	7	7	7
Total observation	39	5	10	24	11	13	146.0	6	11
Average	5.63	0.63	1.63	3.45	1.53	1.81	20.85	0.91	1.54
Apartment									
Surveyed household	43	43	43	43	43	43	43	43	43
Total observation	226	36	49	141	70	71	1034.2	50	67
Average	5.34	0.89	1.13	3.34	1.82	1.68	25.02	1.21	1.61

Appendix 2: Households or Families in the House

Items	Household/dwelling categories			
	Detached	Semi-detached	Terraced	Apartment
Surveyed houses	234	20	7	43
Total households/ dwelling units/families	680	50	12	64
Average	2.91	2.50	1.71	1.49

Appendix 3: Vehicle Trips per Household per day for Work

Work vehicle trips originated in detached dwellings (Ywd)
$Ywd=0.490+0.226Hsize+1.187Empl+0.268Vown+0.304License-0.848Dd+\xi im$
$=0.49 + 0.226 \times 6.36 + 1.187 \times 1.67 + 0.268 \times 1.14 + 0.304 \times 1.44 - 0.848 \times 1$
$= 4.585$
Work vehicle trips originated in semi-detached dwellings (Yws)
$Yws=0.49+0.226Hsize+1.187Empl+0.268Vown+0.304License+\xi im$
$=0.49 + 0.225 \times 5.65 + 1.187 \times 1.5 + 0.268 \times 0.95 + 0.304 \times 0.75$
$= 4.024$
Work vehicle trips originated in terraced dwellings (Ywt)
$Ywt=0.49+0.226Hsize+1.187Empl+0.268Vown+0.304License+\xi im$
$=0.49 + 0.225 \times 5.63 + 1.187 \times 1.53 + 0.268 \times 0.91 + 0.304 \times 1.54$
3.805
Work vehicle trips originated in apartment dwellings (Ywa)
$Ywa=0.49+0.226Hsize+1.187Empl+0.268Vown+0.304License+1.315Da+\xi im$
$=0.49 + 0.226 \times 5.34 + 1.187 \times 1.82 + 0.268 \times 1.21 + 0.304 \times 1.61 + 1.315 \times 1$
$= 5.986$

Appendix 4: Vehicle Trips per Household per day for School

School vehicle trips originated in detached dwellings (Ysd)
$Ysd=-0.687+0.462Sch+0.191Adult+0.148Vown+0.548Dd+\xi im$
$=-0.687 + 0.462 \times 1.38 + 0.191 \times 3.92 + 0.148 \times 1.14 + 0.548 \times 1$
$= 1.416$
School vehicle trips originated in semi-detached dwellings (Yss)
$Yss=-0.687+0.462Sch+0.191Adult+0.148Vown+\xi im$
$=-0.687 + 0.462 \times 1.25 + 0.191 \times 3.55 + 0.148 \times 0.95$
$= 0.709$
School vehicle trips originated in terraced dwellings (Yst)
$Yst=-0.687+0.462Sch+0.191Adult+0.148Vown+0.362Dt+\xi im$
$=-0.687 + 0.462 \times 1.63 + 0.191 \times 3.45 + 0.148 \times 0.91 + 0.362 \times 1$
$= 1.014$
School vehicle trips originated in apartment dwellings (Ysa)
$Ysa=-0.687+0.462Sch+0.191Adult+0.148Vown+1.215Da+\xi im$
$=-0.687 + 0.462 \times 1.13 + 0.191 \times 3.34 + 0.148 \times 1.21 + 1.215 \times 1$
$= 2.075$

Appendix 5: Vehicle Trips per Household per day for Shopping

Shopping vehicle trips originated in detached dwellings (Yhd)
$Yhd = -1.415 + 0.108Hsize + 0.770Empl + 0.044Inc + 0.312Vown + 1.243Dd + \xi im$
$= -1.415 + 0.108 \times 6.36 + 0.77 \times 1.67 + 0.044 \times 25.16 + 0.312 \times 1.14 + 1.243 \times 1$
$= 3.381$
Shopping vehicle trips originated in semi-detached dwellings (Yhs)
$Yhs = -1.415 + 0.108Hsize + 0.770Empl + 0.044Inc + 0.312Vown + 1.759Ds + \xi im$
$= -1.415 + 0.108 \times 5.65 + 0.77 \times 1.5 + 0.044 \times 22.17 + 0.312 \times 0.95 + 1.759 \times 1$
$= 3.268$
Shopping vehicle trips originated in terraced dwellings (Yht)
$Yht = -1.415 + 0.108Hsize + 0.770Empl + 0.044Inc + 0.312Vown + \xi im$
$= -1.415 + 0.108 \times 5.63 + 0.77 \times 1.53 + 0.044 \times 20.85 + 0.312 \times 0.91$
$= 1.573$
Shopping vehicle trips originated in apartment dwellings (Yha)
$Yha = -1.415 + 0.108Hsize + 0.770Empl + 0.044Inc + 0.312Vown - 1.411Da + \xi im$
$= -1.415 + 0.108 \times 5.34 + 0.77 \times 1.82 + 0.044 \times 25.02 + 0.312 \times 1.21 - 1.411 \times 1$
$= 1.631$

Appendix 6: Vehicle Trips per Household per day for Recreation

Recreation vehicle trips originated in detached dwellings (Yrd)
$Yrd = -1.97 + 0.424Hsize - 0.269Empl + 0.407NEmp + 0.639Vown + 1.741Dd + \xi im$
$= -1.97 + 0.424 \times 6.36 - 0.269 \times 1.67 + 0.407 \times 2.24 + 0.639 \times 1.14 + 1.741 \times 1$
$= 4.659$
Recreation vehicle trips originated in semi-detached dwellings (Yrs)
$Yrs = -1.97 + 0.424Hsize - 0.269Empl + 0.407NEmp + 0.639Vown + \xi im$
$= -1.97 + 0.424 \times 5.65 - 0.269 \times 1.5 + 0.407 \times 1.75 + 0.639 \times 0.95$
$= 1.341$
Recreation vehicle trips originated in terraced dwellings (Yrt)
$Yrt = -1.97 + 0.424Hsize - 0.269Empl + 0.407NEmp + 0.639Vown + 3.134Dt + \xi im$
$= -1.97 + 0.424 \times 5.63 - 0.269 \times 1.53 + 0.407 \times 1.81 + 0.639 \times 0.91 + 3.134$
$= 3.458$
Recreation vehicle trips originated in apartment dwellings (Yra)
$Yra = -1.97 + 0.424Hsize - 0.269Empl + 0.407NEmp + 0.639Vown + 1.909Da + \xi im$
$= -1.97 + 0.424 \times 5.34 - 0.269 \times 1.82 + 0.407 \times 1.68 + 0.639 \times 1.21 + 1.909 \times 1$
$= 3.251$

Decision-Making in Sustainable Urban Mobility Planning: Common Practice and Future Directions

Frederic Rudolph, Colin Black, Kain Glessor, Hanna Hüging, Oliver Lah, James McGeever, Giuliano Mingardo, Graham Parkhurst, Aljaž Plevnik, Ian Shergold, Martijn Streng

1 Introduction

The key characteristic of sustainable transport planning is a holistic approach to urban mobility of people and goods that aims to balance economic, social and environmental objectives. This perspective covers all transport modes and aims to shift the focus away from pure provision of infrastructure to a more integrated and active approach to manage demand. It goes far beyond 'traditional' transport planning, which is frequently criticised for looking at transport modes in silos (i.e. separate and distinct from another), and for the lack of evaluation of its measures (Hutton 2013; Wefering et al. 2013).

The European Commission aims to foster sustainable local transport systems through the concept of "Sustainable Urban Mobility Plans" (SUMP), which it introduced in its Action Plan on Urban Mobility in 2009 by advising the take-up of SUMP in Europe. In June 2010, the Council confirmed the Commission's support for SUMP (EC 2009; Council of the EU 2010). The SUMP guidelines contain recommendations for all stages of local transport planning, from preparation to goal setting, through to the subsequent implementation of the plan. An emphasis of the guidelines is the development of effective packages of measures, which are considered to be vital to deliver on the objectives outlined in the SUMP. The measures should ensure value for money, and thus their selection and appraisal is considered an 'important milestone' of a SUMP (Wefering et al. 2013, 58). Accordingly, the guidelines also refer to appraisal methods and tools which can be used.

Decision-making processes in many countries are still heavily influenced by mainstream economic theory, with project appraisal processes helping public bodies make choices in terms of economic,

transport and mobility goals that can be expressed in monetary values. Transport projects compete for limited public funding; the projects chosen should therefore provide sufficient value for money.

As one of the main ambitions of the SUMP concept is to support the implementation of value for money measures, part of the SUMP process is decision-makers discussing how mobility initiatives should be appraised, and within that, how value for money is defined.

This paper is intended as a think piece. It highlights the challenges for cities in selecting sustainable and cost-effective transport and mobility measures. Thereby it shall provoke thought on the implications for decision-making resulting from SUMP.

Firstly, an understanding of the challenges of determining a transport project's viability will be conveyed. Secondly, the paper presents five case studies of sustainable urban mobility planning and the role of project appraisal in those policy-making processes.

In discussing the challenges of traditional project-appraisal and examining actual local decision-making, the paper finds some crucial challenges in the appraisal of small-scale sustainable transport activities. It concludes by highlighting potential implications of these.

2 Common practice and challenges in transport project appraisal

The concept of evidence-based decision-making is intended to help policy makers maximise the return on their investment by basing decisions on ex-ante assessment of measures' potential effects, ideally across all relevant sectors. Cost-benefit analyses (CBAs) define a measure's viability by its relevant direct and indirect impacts in monetary terms only. They are widely used to assess transport projects or measures, especially large-scale infrastructure projects or other politically sensitive projects (e.g. congestion charges) (Hüging et al. 2014). Odgaard (2006), in a survey of 26 European countries, found that all use CBAs in road project appraisal.

The UK's and the Netherlands' guidelines for the appraisal of transport projects require CBAs for major transport projects (Geurs et al., 2009). In the Netherlands, national funding for local and regional spatial infrastructure plans is contingent on the completion of CBAs for the plans (Beukers et al. 2012).

In contrast to CBA, Multi-Criteria Analysis (MCA) allows appraisal of non-monetary impacts, and may be used to compliment or in conjunction with a CBA (Bristow and Nellthorp 2000; Odgaard et al. 2006). For example, the WebTAG tool in the UK allows for qualitative considerations by including five 'cases' that make up the overall 'Business Case' (strategic, economic, commercial, financial and management case) (Geurs et al. 2009)¹.

However, due to CBA's comprehensiveness and seeming clarity due to its reducing many socio-economic factors into a few numbers, the method, and figures derived from it (e.g. benefit-to-cost Ratio [BCR] and Net Present Value [NPV]), are very powerful in decision-making processes. At the same time, project appraisal approaches in general, and CBAs in particular, are heavily criticised for not adequately reflecting reality or not responding to the necessities of practice. The following sections summarise key aspects of this criticism.

Travel time dominates CBA results

Travel time savings often dominate CBAs, but appear to be of minor relevance in practice. Time savings are usually an accumulation of a great number of small savings which may be too small even to be noticeable by the individual travellers (e.g. 1-2 minutes per trip, for 500,000 travellers per day). Travel-time values (e.g. €/minute) are often assigned homogeneously to all travellers², although different travellers assign different values to their

1 WebTAG includes a flow diagram in its first section. This shall guide the user (e.g. a local authority) to select the best performing option. However, the challenge is to clearly define a problem, and to scope and evaluate all possible solutions in a rigorous way.

2 In the UK, the labour cost is used for time 'lost' in the course of work, and ranges therefore from about €10-50 per hour. Commuting is valued about €7.50 per hour and all other travel about €6-7 per hour, based on empirical willingness to pay studies.

time. Furthermore, travel time reliability – i.e. accurately predicting trip durations – might be more valued by (some) travellers than average savings (Van Wee et al. 2006; Metz 2008; Raux et al. 2012). Hutton (2013, 221) demonstrates the nonsensicality of the significance afforded time savings by pointing out that in a CBA, "a time saving of just one minute by each car driver ... has roughly the same value as somebody's death". Furthermore, the time savings could be considered needless as in the long run, as the savings are "consumed as extra distance [travelled] so that a constant time budget is maintained" (Whitelegg 2013, see also Schafer and Victor 2000).

CBA does not encapsulate the full range of externalities

Conventional CBAs often fail to appropriately incorporate wider social, environmental and economic costs and benefits. Several non-monetary effects relevant to transport projects are rather difficult to quantify and monetise, for which reason these might not be properly reflected in a CBA or MCA (Browne and Ryan 2011).

Many effects, such as noise or air pollution associated with a transport project or measure, are difficult to measure in precise economic terms, but are nevertheless valued highly by individuals and society as a whole. Including these effects in a CBA requires their (often elaborate) monetisation; this can be done by, for example, assessing citizens' 'willingness-to-pay' for the benefit. However, such effects may be simply excluded because of the excessive effort required to include them, especially for small-scale projects.

Project appraisal is overly optimistic

CBAs may be compulsory for projects or plans in order to qualify for funding. Beukers et al. (2012) found that if a CBA is necessary to obtain funding, often overly optimistic assumptions are used in the assessment to ensure a favourable BCR.

Flyvbjerg (2012, 764) points out that differences between estimated and actual costs and benefits in project appraisal methods are "best explained by political and organizational pressures ... to present business cases as favourably as possible,

that is, with low costs and high benefits, in order to beat the competition"³. James (2010) points to an example for obvious manipulation of data in a CBA for a link road in Lancaster, UK (Heysham M6 Link Road, HM6L), concluding that the "HM6L should be scrapped rather than deferred" (James 2010, 31).

Additionally, there is often a risk that CBA enters the planning process too late to play any meaningful role (Mackie et al. 2014).

Accurate project appraisal requires considerable data

Among the disadvantages of the CBA method are its extensive data requirements and complexity (Browne and Ryan 2011). Conducting a CBA ex-ante is often only approved if the implementation of the measure in question is already likely. Data collection for potential alternatives may be deemed too expensive, and funding rules do not necessarily require a comparison of alternatives. In this case, a CBA is sometimes used to 'confirm' the benefits of a measure and to justify its implementation. As such, the CBA's outcome might be preordained, increasing the risk of bias (e.g. negative indicators are not included). Many local (sustainable) transport measures are low-cost compared to large-scale infrastructure projects. The data and work required to conduct a CBA – including a wide range of externalities – are excessive in comparison with the costs of the measure itself.

General criticism of project appraisal

Many appraisal techniques attempt to quantify and compare disparate effects, in order to allow the best (or least bad) trade-off to be found; a laudable attempt to move away from normative decision-making with increased (motorised) transport as the goal or accepted consequence. However, this approach can be seen to implicitly assume that the various effects mitigate each other, which they probably do not, and to support the commodification (or even worse, the ignoring or exclusion) of environmental and social issues (Ackerman and Heinzerling 2002). For example, an appraisal may find that the negative effects of a project on the environment and/or vulnerable or marginal

³ Funding procedures may include an 'optimism bias' factor to address this.

groups are outweighed by the positive effects (probably enjoyed by other groups); i.e. the project's benefit is essentially being bought with the negative effects on the environment (borne by society at large and/or future generations) or vulnerable/marginal groups. Appraisal methods which apply a weighting to the various effects (may) go some way to addressing these criticisms, but the basic principle remains the same. Rather than giving economic aspects (sole) primacy, transport policy-making should acknowledge that ever-increasing transport is not (and is unlikely to become) affordable in environmental terms and therefore that society must look for other ways to enhance their economies (Banister, 2011), and that social implications of transport must be considered, irrespective of whether they are quantifiable or not (Tingvall and Haworth, 1999). In other words, a shift to a new normative position is necessary, wherein environmental and social aspects (along with economics) are given primacy in transport policy-making.

Summary

Project appraisal was developed and is mainly conducted in order to assess major transport projects, e.g. highway schemes. It requires the collection of considerable data and the application of elaborate quantitative and/or qualitative methods. Project appraisal may not be appropriate for a range of small-scale, local measures due to the expense. Moreover, as project appraisal was developed for infrastructure schemes, appropriate methods to assess other types of measures are still being developed. Even if appropriate methods were available, they could still be prone to optimism bias.

3 The role of project appraisal in local decision-making

Sustainable urban mobility measures include, for example, interventions in the areas of clean vehicles and fuels, urban freight, demand management strategies, mobility management, collective passenger transport, transport telematics, and strategies to reduce dependency in cars. Where attempts have been made to assess the BCR of such measures, the results are often positive (Raux et al. 2012, Cavill et al. 2008). Jacobs Consultancy (2011)

compiled a database of close to 150 small scale public transport schemes in the UK obtained from local authority bodies. The results suggest that such projects can be at least as cost effective, if not more, as larger capital projects. Moreover, in many cities it has been demonstrated that 'hard measures' such as infrastructure improvements, and 'soft measures' such as travel plans and campaigns⁴ complement each other in contributing to transforming the transport system toward sustainability (Kolbenstvedt 2014, Brög et al. 2009). However, ex-ante appraisal of (packages of) such measures is rare, as is information about cities' actual rationale for their decisions.

In the following, SUMP planning processes in five European cities (Munich in Germany, Bristol in the UK, Utrecht in the Netherlands, Kaunas in Lithuania, and Piran in Slovenia) are examined, focussing on the process of measure selection and appraisal. The cases represent the different level of SUMP maturity throughout Europe⁵.

Munich's Transport Development Plan

The German city of Munich and its outlying districts are experiencing a phase of rapid economic growth, resulting in more jobs and population growth. The Munich Transport Development Plan (TDP) was developed in response. The TDP lays down the city's (major) policies and measures to shape local personal and goods transport, including specific commitments for each transport mode (City of Munich 2006).

A transport demand forecast for the year 2015 laid the groundwork for the TDP, including three 'test scenarios'. The measures which were finally stipulated were built on the information the scenarios had delivered. The TDP included provisions for all modes, for mobility management as well as infrastructure expansion. A particular focus was on soft and integrative measures (ibid.).

⁴ Travel plans can be defined as a long-term mobility management strategy for an organisation and its various sites or business park. Awareness raising and marketing campaigns typically focus on different aspects, e.g. active travel or traffic safety, and target groups, e.g. pupils or commuters.

⁵ A comprehensive discussion about quality of life and Sustainable Urban Mobility Planning can be found in Whitelegg (2013).

As a result of previous CBAs for rail infrastructure schemes, the TDP stipulates tramways rather than underground railways. As the city of Munich already has a dense public transport network, any benefits from of network expansion/upgrades would be marginal according to the standardised appraisal procedure (Interview, Koppen).

The decision-making process within TDP development did not include CBAs beyond the aforementioned (obligatory) assessments, as this would have been too expensive and time-consuming. However, Munich's council would not endorse any policy or measure that has not undergone any kind of project appraisal. Most of the SUMP's soft policies and measures were appraised based on internal estimates and qualitative impact assessments. Moreover, experience from previous projects and ongoing initiatives was an important part of the decision-making process. Over the last decades, the city has conducted CBAs for selected policies and measures, e.g. for introducing parking fees, which generated a good BCR. Since then the city assumes these sorts of policies and measures generally provide good value for money.

As can be seen in the previous paragraph, the few project appraisal methods performed, such as the CBA, are not a decisive factor for transport project approval. Instead, the TDP's policies and measures had to follow the city's overall concept (including goals such as avoiding transportation and shifting away from motorised transport), approved by the city council and developed by city officials. In addition, the TDP and its measures were discussed in public participation processes, and the budgets passed by the city council. Thus, sustainable transport is first of all a result of political commitment.

Munich's TDP

Reasons to conduct project appraisal:

- To access funds
- To compare alternatives

Reasons for measure selection:

- To achieve local (sustainable) transport goals
- Value for money

West of England's Joint Local Transport Plan

The West of England brings together the Cities of Bristol and Bath and their immediate surroundings for the purposes of a range of plans and strategies.

Local government in England uses a planning approach known as Local Transport Plans (LTP) to respond to transport issues and needs. In the case of the West of England, four authorities have cooperated on a Joint Local Transport Plan (JLTP), with the current implementation covering the period 2011-2026 (referred to as LTP3 as it is the third cycle of LTP planning since it came into being in 2001). The LTP underpins transport strategy, and gives direction to investment in transport resources. It has, though, been supplemented over recent years by a series of competitive funding streams from central government on specific (sustainable) transport initiatives. These have included the Local Sustainable Transport Fund (LSTF) 2013-2015 and the Cycle City Ambition Grants (awarded in 2013 for spending by 2015). Bristol and the West of England grouping have successfully bid to both of these latter funding schemes.

The West of England JLTP sets five key transport goals and a number of corresponding 'shift' and 'improve' measures for both passenger transport and freight. Some measures were also designed to respond to the specific goals in the LSTF funding bid. The bid for Cycle City Ambition Fund monies looked to build on the burgeoning 'cycling culture' resulting from earlier cycling programmes. Measures focused on (strategic) cycle routes connecting commuters with employment areas in Bristol city centre and on the urban fringe to the north of the city, whilst in the neighbouring city of Bath the investment was at the heart of the urban cycle network – where multiple routes converged.

Project appraisal needs to comply with Department of Transport (DfT) guidance (WebTAG) and use an 'approved' transport model to provide outputs on expected outcomes from interventions. WebTAG applies to all transport measures for which funding is sought and includes a CBA assessment and a table of non-monetised

factors. The final decision is therefore a qualitative one, although the BCR carries considerable weight and must always be greater than 1:1⁶.

The JLTP is primarily seen as a strategy document, incorporating a range of proposed and desired interventions that will aid more sustainable mobility in the plan area. Some of these interventions may be more likely to be implemented than others. As a consequence, it is not a requirement to submit a cost benefit analysis with the JLTP itself, although the subsequent funding requests to implement measures will follow the approach described above. This will include CBA as well as 'non-monetised' factors, and results will be presented in a combined format in a one-page Appraisal Summary Table.

The projects included in the LSTF bid by the West of England were first 'health checked' and refined using the *Early Assessment and Sifting Tool* (EAST⁷) also developed by the DfT. This spreadsheet-based tool looks to provide a uniform format for assessing the costs and impacts of all transport-related options. It provides a mechanism aimed to identify – at a high level – the nature and extent of all the economic, environmental and social impacts of options, and in addition the distributional effects of many of them. Economic factors considered by the tool include: will journeys get shorter, quicker and/or cheaper, and will the measure impact on the day to day variability in journey times or the average minutes of lateness? The EAST process includes CBA using WebTAG methods. In the case of the LSTF, the assessments required by EAST were further developed as supporting justification for the proposed projects in the Business Case of the bid.

In addition, the *Health Economic Assessment Tool* (HEAT, another form of CBA), developed by the WHO, was used to assess the physical activity impact of measures. Cycle measures were also appraised

⁶ Expectations are normally higher for a scheme to be supported. National treasury recommends 1.4 as the normal minimum.

⁷ EAST is a DfT approved decision support tool that has been developed to quickly summarise and present evidence on options in a clear and consistent format. It provides relevant, high level, information to help decision-makers form an early view of how options perform and compare. For example options may be compared within modes or across modes, geographical areas and networks.

based on an approach modelling a 'mode shift' to cycling against traffic levels and public transport use. A similar approach was taken for the assessment in the Cycle City Ambition Fund bid process (Halcrow 2013).

Utrecht Bereikbaar

Bristol's LTP

Reasons to conduct project appraisal:

- To access funds
- To compare alternatives

Reasons for measure selection:

- To achieve local (sustainable) transport goals

Utrecht is one of the four largest cities of the Netherlands and, due to its central geographic location, it is a crucial national transport node. In 2008, major road construction works were initiated on the A2, the biggest motorway in the Utrecht region. To prevent significant nuisance, different mobility management initiatives were implemented, most of them within the framework of Utrecht Bereikbaar (Utrecht Accessible). Though the main aim of Utrecht Bereikbaar is to keep the city accessible during road construction, the measures applied have a much broader scope and objectives. An important element of Utrecht Bereikbaar is the Utrecht Bereikbaar Pass, a card that provides access to bus, tram, train, public bicycles, internet hotspots, express coaches, and Park and Ride facilities.

The main objective of ensuring accessibility during the road works fitted very well with Utrecht's general objective of developing a more sustainable transport system and stimulating non-car transport modes. The target was 2,000-4,000 fewer cars on the road during peak hours during the road construction. Results show that 40% of the passholders had previously travelled by car, leading to a reduction in car traffic of approximately 5,000 cars per day (EPOMM 2013).

Moreover, another objective was to build a central station ready for growing transport flows and to develop cycling as primary mode of transport in the city (Utrecht 2012). As the building of the central sta-

tion is a large infrastructural project, national law [OEI guidelines] demanded a CBA. The results of CBAs are considered in the decision-making process, but not binding. In the Utrecht case, CBAs have been carried out for various parts of the infrastructural developments. One CBA, carried out by the Ministry of Transport, was not carried out before the project, counter to normal procedure. This CBA focussed on the number of 'spitsmijdingen' (fewer cars on the road during peak hours) on the main highways, considered to be the main benefit by the Ministry of Transport, which is responsible for the highway network (ibid.) and was used to contribute to the discussion on whether or not to continue with the Utrecht Bereikbaar pass (Interview, Degenaar). As the CBA showed high costs compared to the benefits of the pass, the government decided to stop funding it (although it continued on a private basis).

Utrecht Bereikbaar

Reason to conduct project appraisal:

- To justify the measure's cost-effectiveness

Reasons for measure selection:

- To ensure accessibility during road works
- To achieve (sustainable) transport goals

Kaunas Master Plan

Kaunas is the second largest city in Lithuania with a population of approx. 307,000 covering 157 km² and with a population density of 1,955 inhabitants per km². Kaunas is a main logistics hub for Lithuania and the wider Baltic States region. The city faces some challenging issues relating to urban development, traffic congestion and public-transport improvements.

Implementation of a SUMP in the city has yet to start. It will be based around already established city planning processes and closely linked to a municipal *Master Plan* for the period 2013-2023. The Ministry for Transport and Communication provides some incentive to encourage SUMP implementation by providing funding for sustainable transport activities.

Stakeholders in Kaunas have been actively contributing to EU transport and mobility projects since 2002. Many of these projects have helped the city to develop a participatory process and have contributed to the availability of information. The development of the final City Master Plan (2013-2023) will help to form the main priority areas for future SUMP development.

The main goals of the SUMP will be to reduce private car usage, to increase the quality and quantity of public transport journeys, a substantial expansion of and improvement in the city's cycling infrastructure, and a revival of the historic old town. Consequently, it is expected that these goals will provide the city with a higher quality of life along with emissions reductions (in line with EU and national targets). A revival of the historic old town is also expected to include a rethink on car parking. This is in line with a newly approved city *Special Plan* on car parking, which aims to reduce congestion and decrease noise, and NOx and particulate emissions. However, a large part of a pedestrian boulevard, which is currently being renovated at a cost of €20m, will be redeveloped for car parking. None of these envisaged measures have been appraised. Many of the transport initiatives are based on EU regulations governing clean air and clean vehicles. Some periodical surveys related to public transport include travel patterns and contribute to the decision-making of public transport operators. Also Kaunas Technical University (one of the biggest in the Baltic States) has recently produced Lithuania's first *University Mobility Plan*. It is expected that this will play a role in determining specific area parking demands as well as determining how and where to improve pedestrian and cycling routes.

Kaunas Master Plan

Reasons to conduct project appraisal:

- None conducted

Reasons for future measure selection:

- To achieve (sustainable) transport goals
- To embed sustainable mobility as a way of life in the city
- To access funds

Piran's SUMP

The municipality of Piran is one of three coastal municipalities in the Republic of Slovenia. It has around 17,000 inhabitants and covers almost 45 km². It has long been active in the field of sustainable mobility; as a tourist town with very specific geography of the historic centre it has had to react to a worsening transport and accessibility situation. The city of Piran is unique in Slovenia and beyond: it has a dense, historic layout, is situated on a peninsula, has many spatial limitations on access, very concentrated population and a strong tourism sector. All of these elements are a great challenge for transport planning in the area.

SUMP is a new topic in Slovenia and its preparation process doesn't normally include CBAs. National guidelines on SUMP suggest use of simple appraisal of possible measures against the objectives as part of measure selection process. However, CBA may be used later in the implementation process, on the measure level, and it is formally requested for bigger infrastructural projects.

The SUMP for the Municipality of Piran was prepared in 2012 within the *Adria.MOVE IT!* Project, itself part of the IPA *Adriatic Cross-Border Cooperation Programme*. Some of the measures defined in the SUMP had been financed through the *Adria.MOVE IT!* project already. Development of the SUMP was based on a number of previous transport plans and is also well coordinated within the *Strategic Spatial Plan* (2010).

The objectives of Piran's SUMP have been set for the next 5 years: first and foremost the reduction in the share of personal motorised traffic. The implementation of SUMP measures in Piran are planned in several steps. Firstly, the measures developed within the *Adria.MOVE IT!* project, the implementation of which started in 2012 and finished in 2013. In the second phase, new organisational and other measures are planned with a focus on walking and cycling. Implementation of measures in this group will start after the formal approval of the SUMP. Measures in the third phase are investment measures to assure the appropriate number of parking spaces

for inhabitants and visitors of Piran. Implementation of these measures depends on assuring the needed funding (public or private) and spatial planning procedures. CBAs have been completed for the measures in the first phase (improvements of accessibility of bus connection, a bike sharing scheme and a logistic platform with electric vehicle for goods delivery) after the selection of measures (Občina Piran 2012). Their purpose was primarily to show the predicted effects of the measures and thereby support implementation of the measures. Measures in the following two phases of SUMP were not subject to project appraisal.

Piran's SUMP
 Reason to conduct project appraisal:

- To justify measures' cost-effectiveness

Reasons for measure selection:

- To achieve local (sustainable) transport goals
- To access funds

4 Findings

The case studies illustrate contemporary decision-making. Table 1 lists the appraisal methods used in the cities' decision-making processes and the basis for measure selection. Four out of the five cities used CBA in their decision-making processes. The main rationale of Munich and Bristol in conducting CBAs was to access funding for some of the measures which their SUMP had stipulated. In Utrecht and Piran, CBAs were used to determine the measures' cost-effectiveness, but not to compare alternatives. In Utrecht, CBA results led to the termination of public funding, but the measure in question was continued on a private basis regardless.

Measure selection in all five cases was mainly based on the political agenda or as a response to looming problems in the city. The projects were discussed in public participation processes and approved by politicians. In the cases of Munich, Bristol and Utrecht, CBAs did not play a significant role for decision-making, but project appraisal had been conducted for other reasons regardless. However, as the case of Piran shows, the main purpose of conducting a CBA may also be to verify already envisaged effects rather than to fulfil funding requirements.

None of the cities conducted CBAs or similar project appraisal methods for schemes not requiring investment. In these cases, the cities mainly relied on rough self-estimates. It appears to be too expensive to apply traditional appraisal methods for small-scale measures. If cities want to ensure that the SUMP measures they implement are both sustainable and provide value for money, they must rely on methods which were initially designed to appraise large-scale schemes which may skew the results. But equally, politicians' pre-conceived ideas and pet-projects are not necessarily sustainable, or cost-effective.

In two of the five case studies (Munich and Bristol), a combination of appraisal techniques and rough estimates was used to test the performance of alternative measures. Thus, decision-making embedded in SUMP may foster testing of alternatives, which may in turn increase the value for money of measures implemented. But such testing could also be misleading, if, for example, project appraisal techniques are stipulated by dedicated infrastructure

	Munich	Bristol	Utrecht	Piran	Kaunas
Main reason(s) for project appraisal	Access to funds		Justification of measures' cost-effectiveness		No project appraisal
	Comparison of alternatives				
Main reasoning for measure selection	Achievement of local (sustainable) transport goals				
	Other reasons			Access to funds	

Table 1. Rationale in applying project appraisal and measure selection.

funding streams.

An important part of a SUMP is to implement packages of measure which mutually reinforce each other. But appraisal of packages seems to go beyond the capabilities of current appraisal practice.

In conclusion, there appears to be a fundamental contradiction in the need for assessments to be well founded, and yet not cost too much to perform. Additionally, policy-makers should appraise alternatives to increase overall value for money and to effectively address looming problems in the city. In order to limit undue expenses, they should try to simplify appraisal techniques and adapt existing methods to local circumstances. But they should also discuss whether the steps taken to simplify performing assessments (e.g. replacing verifiable data with assumptions or judgements) detract from the results to the point of making the assessment (politically) unusable. There may be a 'happy medium' which would have to be locally defined according to the characteristics of the measures in question. In any case, the assessment process and the underlying assumptions should be transparent and all relevant environmental, social and economic impacts should be included. Assessing indicators in a simple or qualitative manner will encourage cities to at least consider wider sustainability effects, which are often neglected in traditional appraisals.

Assuming assessments are simplified by replacing solid data with assumptions and judgements, policy-makers should also discuss what could be done to prevent these being manipulated to tailor the results to confirm already-made decisions, as is sometimes the case with CBA currently.

A core question is to what extent the results of project appraisals influence decision-making processes. It is possible that the public may care more for rhetoric than calculations. Especially if there is no workable solution for project appraisal, sustainable urban mobility measures may be better served by increasing awareness among local decision-makers of their benefits. A holistic, even only descriptive, overview of

the benefits and costs of sustainable policies might strengthen policy-makers' ability to convince their electorates of such policies' merits. This would not necessarily lead to best value for money, but at least favour sustainable over unsustainable transport schemes.

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Foodstuffs in transit: An ecological disaster!

Helmut Holzapfel

Original broadcast: Sunday, 30 November 2014, 8.30 a.m.

Editor: Ralf Caspary

Production: SWR 2014

Introduction:

This is the transcript of a talk presented on a prominent public radio station in Germany. The central idea was to inform people about problems associated with the continual growth in global freight traffic which are resulting in more negative effects than benefits. Until now these problem has hardly been discussed in many countries, although the international trade agreement TTIP between Europe and the USA is currently being negotiated and if enacted would certainly lead to further growth in the transport of goods. In the negotiations for a climate agreement, the global transport of goods has received almost no attention as a source of greenhouse gas emissions.

Radio station's introduction:

A consumer in Germany can buy nearly anything that his or her palate might desire: fresh salmon and tuna fish from Canada, fresh butter from Ireland, algae from Japan, apples from Chile or mangoes from Africa. The growing trend to transport foodstuffs by truck, ship or plane around the globe causes significant ecological problems, in particular in connection CO2 emissions generated by this transport. Helmut Holzapfel, a transport expert from the University of Kassel, explains why such practices need to be curtailed.

Helmut Holzapfel:

The German transport minister estimates that transport activities will increase by at least 78% in his country by 2025. This figure for so-called "transport output" is based on the number of kilometers traveled multiplied by the number of tons that are being transported. According to this estimate, alone in Germany we will have 78% more transported goods on the roads. Other forecasts cite figures between 60 and 80 percent. These are amounts that will be added to the ever increasing transport of freight already taking place.

On top of this comes the increase in lorry transport to foreign destinations as well as the flow of goods on ships, airplanes and trains.

There are many opinions and views and political statements about this type of growth that are presented to us in the newspapers or which we hear about in other media. Many people see this growth as a positive phenomenon. They say that when things are humming on the roads of Germany it means that the economy is growing and the worldwide exchange of goods is expanding and that therefore the increasing transport activity is a sign of more work and more secure jobs in our society. And this will ultimately have a positive effect on our overall economic figures, particularly here in Germany.

Others see this growth more negatively. They complain about increasing noise, damage to roads, increasing emission of air pollutants, pollution of rivers, oceans and the climate in general that is caused by lorries, ships and airplanes.

And then there is an underlying opinion that these developments are in any case unavoidable and cannot be changed. But is this really the case? What are the actual causes of these phenomena and are they in fact unalterable? In the following, we will take a look at what has given rise to this growth in distances travelled and in the overall volume of transport. How can it be that the transport of goods is increasing even more than the growth in the economy as a whole? The consumption of foodstuffs, for example, has hardly increased at all in the last 20 years, but in the same time period, food transport has increased by 20 percent. How can this be?

Let's begin by looking at how industry works. In industry, so-called division of labour was introduced initially in the individual factories, but this was then expanded and products and components were exported more and more or imported from farther away. Today the division of labour takes place on a global basis.

An example will show what I mean: For Christmas in 2013 I bought myself a laptop on the Internet from a world-famous

company. At that time the exact transport status of this product was shown in the Internet. I could see along which routes the computer was making its way to me. Web order number: W75057815; activity: shipment in Taipei. The laptop was produced in Taiwan – that was on 17 December. On 18 December it had already gone through the Taiwanese customs and was sent to Luxembourg. There it went through the Luxembourg customs and continued on to Eindhoven in the Netherlands. There on 22 December an additional memory chip was added to the device. From the Netherlands it went once more through customs and then by plane to Wiesbaden in Germany where it arrived on 23 December at 3:55 a.m. A lorry transported the laptop further and indeed I was able to receive it on the same day by noon.

We can see then that not only was the computer produced far away from where I live in Germany, it was also brought to its final destination here via very complex transport routes with the involvement of several airplanes and a lorry.

Nowadays many products are produced around the world in processes that divide the production into multiple steps. The reason behind this is an effort to keep the production costs as low as possible. Low wages or the availability of raw materials in particular regions are means of keeping costs down. In Germany, for example, there are hardly any more clothing factories. One consequence of this was experienced by German football fans. When Germany won the World Cup in 2014, jerseys with the four stars of the new world champion were initially unavailable in Germany. They were being produced in China. Efforts were made to get the Chinese company to manufacture the special edition jerseys as quickly as possible. They were shipped to Germany by plane and in fact within a week they were available in German shops for sale.

But it is not only the finished goods that come from distant locations. Their components are also produced at many different locations – and this is where things get interesting. We say that the manufacturing depth of a product decreases when the final producer who actually brings the

product to market has an ever smaller role in the actual production of this product. When you buy a German automobile today, 75 percent of its components come from other countries. They must first be flown or brought by ship to Germany. This manner of production is what is responsible for the increasing flows of goods that we talked about at the beginning.

Not only are finished products being imported, also the components of products must first be brought to the production location. This leads in practice to situations like this: In Kassel, Germany, there is a factory that manufactures axles for delivery lorries and other small trucks produced by a large automobile company. Or so one imagines. In principle, these axles are only assembled in Kassel. If you've seen the rear axle of a lorry, you know that in the middle there is a large casting that contains the gearbox. In earlier times, these castings were produced in the vicinity of Kassel and brought to the factory. The casting factory has long since closed because these parts are now produced centrally in India. This means, of course, that they have to be brought to Germany – in this case by ship. This is not so bad, but even ship transport has negative effects through the emissions coming from diesel engines. And if there are production errors, then the parts must be quickly replaced. That means that when you are on a flight from India to Germany it may be that in the luggage compartment beneath where you're sitting there is an axle casting that is flying with you to quickly correct a production error. This housing made of cast metal is, of course, filled with various components. Some of these are produced in the USA, for example the gears. In fact, in some instances the whole cast metal housing with individual gears already installed

is sent to the USA where some missing parts are added and then the whole unit comes back across the ocean to Kassel. Here in Germany it is built into a lorry that may then be delivered to America to be sold there. So you can see that when you buy a car today its parts and components have probably travelled many more kilometres than you will ever travel with the car that you are acquiring.

In food production, the production steps are even more complex with a broad range of negative consequences. Foodstuffs are sensitive. Many of them must be kept cool during the transport. This affects the choice of a means of transport (ship, lorry or plane). The volume of food transport has increased in recent years to a worrying extent. In spring, potatoes come to Germany mostly from Egypt, apples increasingly from China. Chinese apples are also shipped now to Italy because the Italians are exporting all of their South Tyrolean apples to Germany. When you shop in an Italian supermarket, lots of Chinese apples are on display. Another example: In an organic supermarket, I recently saw organic honey from the Amazon being sold. Why from the Amazon? Because allegedly bees on an Amazonian island are able to produce honey under uniquely natural conditions. I once spoke with a honey producer who said that today honey is always a mix of honeys from various countries of origin. Or take the example of flowers. The largest German flower market is in Frankfurt at the airport. Why? Because flowers are grown in Africa, then flown to Germany and marketed directly at the airport.

For consumers in the shops, the production steps and transport routes of the goods they are buying can hardly be reconstructed. Often on the food packaging one only finds the location of the central office that distributes the product. Two percent of the food products sold in Europe come from China. So when you leave the supermarket with 50 products in your shopping cart in all likelihood at least one product from China will be included – without this being indicated and so without your knowledge.

As with our earlier example of the lorry axle casting, the processing of food products also takes place at different locations. With processed foods it is no longer possible to see where their various ingredients come from. The ingredients of a frozen pizza, for example, no longer only come from Europe but from around the globe. In the 1990s, the researcher Stefanie Böge investigated where the ingredients of a strawberry yogurt sold in Germany came from and discovered that they came from all over Europe. The strawberries were transported from Poland to the com-

pany Zentis in Aachen, processed to jelly there and then brought to the Zentis factory in Stuttgart. That's just one example. Stefanie Böge's findings caused a sort of scandal at that time. Newspapers reported about the results on their front pages. Today you can hardly find any processed food product or a yogurt whose ingredients only come from Europe.

So you can see why the volume of transport has increased more than economic growth. It is a result of the breaking up of the production process which then must be put together again.

With these greater distances, it is of course more difficult to control and monitor a product – both in the conditions of its production and in its actual quality. The apples imported to Italy from China, for example, were partly found to be heavily contaminated with pollutants. Whose fault this was is difficult to determine after the fact since many different small Chinese producers were involved in the production and samples were not taken throughout the whole production process.

A further problem is the dependencies between various means of transportation. This also pertains for industrial production. An example: Some years ago, the SUV models of a large Bavarian automobile company could not be produced for some time because a major volcano eruption in Iceland had shut down air traffic. Screws that otherwise were flown in daily from Taiwan could not be delivered so that the production of these vehicles had to be suspended until the global logistics system once again began to function.

In the food sector there is a similar dependency on deliveries. A global logistics network has come into existence that creates multiple dependencies making it impossible for anyone to know the true origins of ingredients and the individual steps of the production process for a particular foodstuff. The more highly processed a product is, the greater are these dependencies and the more difficult it becomes to effectively control and trace its ingredients.

The effects of this situation are most evident in the food sector. Some foods are

cultivated so that they are easy to transport. There are certain types of apples and tomatoes, for example, that have been developed so as to be less pressure sensitive. Often packaging made of plastic, paper or wood is necessary to bring the goods to Europe with as little damage as possible. This transport packaging is recycled only in part. A significant amount of it also makes its way into the environment and contaminates our water or the air when it is burned. With processed products, often cut-price ingredients without documented origin or quality are mixed in and this is evident only after rigorous control procedures. Deficiencies in natural flavour are compensated through the adding of chemical flavour enhancers.

But are there, in fact, only negative effects from these arrangements? Jobs must be being created, especially in the Third World, one might suppose. This could be a justification for such processes. A closer look, however, shows how problematic this supposition is. The jobs that are created are not what they should be. Whether it is burning clothing factories in Pakistan or generally intolerable working conditions in Africa or China, often the social effects of the global fracturing of production processes are not at all desirable. The lack of effective control, which has already been referred to several times, also affects the labour situation. Furthermore, in Africa for example less food is cultivated for the local population because flowers for export are now growing in the fields there. This can in turn mean that missing local food production capacities result in hunger crises in such areas. Incidents of this sort clearly raise the question whether such displacement of indigenous food production is a desirable development path. Potato cultivation in Egypt requires large amounts of water; the country, however, has a limited water supply. The underground reservoirs that are tapped into for potato production should actually be sufficient to supply the Egyptian population for the coming centuries.

We need to consider what is that we want and what is that really occurs in connection with such arrangements. Frequently the factor of transport is not included in such considerations. When the subject is

new international trade agreements, then job creation is often at the centre of the discussion. Hardly anyone takes note of the increased volume of transport that will result from such agreements. And in fact, the most negative developments in connection with such agreements have to do with transport issues. Air transport in the freight sector is having increasingly negative effects on the climate. Ship transport, which has been assumed to be the most ecologically sound means of transport, causes much more environmental damage than commonly thought, not to speak of the pollution of the oceans caused by throwing garbage overboard.

The fruits of the global economy, which we find in the exceedingly cheap products in our shops, are taken to be beneficial from a business standpoint and from a larger economic perspective. In fact, they are contributing to a slowly developing crisis. Freight transport has become an uncontrollable source of strain on global resources. I doubt very much whether further increases in this strain are justified relative to very limited advantages they will probably bring. When we take all the factors into account that I have mentioned up to now, we may even ask whether it is already too late to move against these trends.

Of course, we do not want to revert to purely regional production as we had for instance in the Middle Ages. But the current level of strain being put on global resources through freight traffic and truly crazy transport arrangements has reached a point where we must ask the question is this the proper course for the future? Do we really want to go further and further in dividing labour processes on a global basis? In 20 years, do we truly want to have a third more lorries on our streets, airplanes in the skies overhead and ships on our oceans as the German transport minister has predicted? And later even more?

What countermeasures could we take in the face of these developments? An increase in transport costs would presumably eliminate some of this excess. Perhaps then it would not be so attractive to drive pork from Belgium over the Alps to a factory in Italy where it is processed into South Tyrolean ham, a phenomenon that

I already encountered in the 1990s and which was subsequently a subject in scholarly publications. But there are transport processes taking place that are even more unreasonable: The lorries travelling on our streets are currently being subsidised. If these subsidies were discontinued, then we would probably have positive effects as the lorries are responsible for substantial damages to the roads. A single lorry puts the same load as 50,000 private automobiles on public thoroughfares. According to current plans, the maintenance and repair of German highways should be financed in future through taxes on private cars in order to further subsidise the supposedly economically beneficial lorry traffic. What we see here is that in fact a great deal is being done not to support local products but to continue to support and promote global production.

An increase in transport costs – whether or not it could be achieved politically – would perhaps not be sufficient to counter such developments. It would presumably slow down these processes but not really reverse them. To me, it seems very important that we first understand the basic causes for these excessive transport processes and also understand that to a substantial extent they make no sense. When they are closely examined they can be seen to be counterproductive and negative for all of us. Only when this is understood, will it be possible to really rethink this issue. Politically it is exceedingly difficult because up until now transport has been regarded as a factor that is subject to automatic growth. There has been no analysis of the causes of this growth and transport problems have not figured into political decisions in any manner. If regional products are again given more value, then we could shop more on a regional basis. In some supermarkets, regional products can once again be found, but also here it is necessary to avoid purchasing processed goods for the reasons that have already been outlined above. It is better simply to prepare some products ourselves. Instead of buying a readymade strawberry yogurt we can buy strawberry jam and plain yogurt and mix the two together. That saves at least one lorry trip from a marmalade factory to a yogurt factory.

As has been made clear here, worldwide transport by lorry, plane and ship is substantially supported with state funding because there is a prevailing opinion that this benefits the economy and produces positive effects. Initiatives to promote more trade with regional products receive less support, despite pretty talk from some politicians, nor is much support provided by the European Union. In the near future, a label should be introduced that provides consumers with more information about the origin of food products. But we have seen that the overall processes have got entirely out of hand. Of course, as individuals we can endeavour to put a stop to global supply chains by making use of known local sources for the things we buy. We can, for example, plant small vegetable gardens of our own. Or perhaps share fruit from an apple tree with a neighbour. These are ways that we really can be sure that we are obtaining and consuming regional products.

Sources:

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The author:

Helmut Holzappel is an urban planner, transport expert and civil engineer. From 1993-1995 he was a professor of Transport Planning at the University of Kassel and director of the working group "Integrated Traffic Planning and Mobility Development", collaborating intensively with transport experts from the USA. After a longer stay in the USA, Helmut Holzappel became the head of transport department in the Ministry for Housing, Urban Development and Transport in the state of Saxony-Anhalt in Germany. Since 1998, he has again been professor for Transport Planning in Kassel while also consulting for the state government in Saxony-Anhalt

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Cox, P (ed) *Cycling Cultures*, University of Chester Press, Published 2015
ISBN 978-1-908258-11-3

Reviewed by John Whitelegg

This is a most welcome book. Cycling as a routine means of transport for everyday trips over reasonable distances (however defined) is a hugely important part of the transport, quality of life, urban design, carbon reduction, health promoting agenda. It is utterly shameful that so many MPs, councillors and transport professionals have not given cycling the recognition it deserves and if we had intelligent transport and urban planning integrated with public health priorities we would already have at least 20% of all our trips every day by bike. Sadly we live in an intelligence free zone when the discussion comes down to co-benefits, joined up thinking and synergy. A few hours spent in an average local authority council chamber would very quickly reveal the animosity often aimed at cycling and cyclists.

The book adopts a very eclectic and wide ranging cultural, sociological and policy perspective on cycling and all those who are involved with shaping transport futures can learn a great deal from the 8 chapters.

The chapter by Horton and Jones is particularly hard hitting and sharply focused and has an important message. It points out that cycling suffers from the ecological dominance of the car and this dominance is cultural, ideological and part of a paradigm that is deeply embedded. The problem lies in the heads of most people involved with the policy process. They think car and they use cars and they cannot see the urgent need to reduce traffic volumes and convert streets and spaces so that they are people friendly and reward pedestrians and cyclists and are not organised around promoting car use and increasing levels of car use.

Horton and Jones should be essential reading for all councillors and all local government officers and all those in central government who think that very big hospitals or very few post offices in some strange way improve quality of life. What

centralisation and a reduction in numbers of "things" do is make walking and cycling much less likely to happen. If we wanted to set out to reduce walking and cycling we would design the kind of policies that are now in place. Key to the attack on cycling is a massive road budget, over-generous car parking, totally inadequate bike parking and segregated bike paths, lack of bike networks and an acceptance of anti-social driving behaviour that beggars belief. As a society we like talking about anti-social behaviour but very rarely link it to breaking the speed limit, parking on pedestrian pavements, jumping red lights, driving under the influence of drugs and drink, using the mobile phone whilst driving, fiddling with the wrap-around sound system or dealing with smoking requirements.

It is very rare to see something as clear as this quote in Horton and Jones:

"The effective promotion of sustainable mobility, including cycling, requires the transformation of the opposite" (page 73)

and

"if promotion does not challenge the status quo, it is doomed to fail"

The book could have done so much more to cover the ground it claims to cover. It does not tackle the really big question of why are we so bad in Britain at upping our cycling levels. London is a world champion at talking up its cycling policies but the results are poor. We still have only about 2% of all trips by bike and Berlin is 15% and Berlin does not go in for all the high profile hype about funny coloured tarmac, pompously named routes or doing deals with large banks on cycle hire.

The book does not discuss the decline in cycling. A DfT report¹ refers to a 25% decline:

"In 2013, 1% of all stages were made by bicycle. Between 1995/97 and 2013 the average number of bicycle stages per person per year has fallen from 20 stages in 1995/97 to 15 stages in 2013; a fall of 25%"

1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/342160/nts2013-01.pdf

This is crucial. Are the data correct? Why have we produced such a poor outcome after years of talking about cycling policy, cycling demonstration towns and smarter choices?

The book does not discuss "Vision Zero" which is the Swedish road safety policy that makes a strong commitment to zero deaths and zero serious injuries and links this to the need to increase walking and cycling by creating a transformation of road traffic danger and its perception as a disincentive to cycle².

The book deserves to be read and to be part of the paradigm shift that is needed to give cycling a chance. It would be very good indeed if the authors would get together once again and produce a policy guide aimed at our thousands of councillors and setting out exactly what they should do if they really do want to increase cycling levels.

2 Vision Zero is discussed in Whitelegg, J (2015) *Mobility*, Straw Barnes Press

http://www.amazon.co.uk/Mobility-Transport-Planning-Philosophy-Sustainable-ebook/dp/B013H0ZYU0/ref=sr_1_1?ie=UTF8&qid=1438837406&sr=8-1&keywords=mobility+whitelegg

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