EJTIR

Issue 10(2)
June 2010
pp. 121-141
ISSN: 1567-7141
www.ejtir.tbm.tudelft.nl

Mobility Management Measures by Employers: Overview and Exploratory Analysis for Belgium

Thomas Vanoutrive[1]
Department of Transport and Regional Economics, University of Antwerp and Department of Geography, Ghent University

Laurent Van Malderen[2]
Facultés Universitaires Catholiques de Mons (FUCaM) and Université catholique de Louvain, C.O.R.E.

Bart Jourquin[3]
Facultés Universitaires Catholiques de Mons (FUCaM)

Isabelle Thomas[4]
Université catholique de Louvain, C.O.R.E.

Ann Verhetsel[5]
Department of Transport and Regional Economics, University of Antwerp

Frank Witlox[6]
Department of Geography, Ghent University

The renewed interest for sustainable transport in Europe is often labelled as mobility management. With this, major attention goes towards the role of employers in the commuting behaviour of their employees. Indeed, employers can encourage a more sustainable commuting by the promotion of alternative modes, like public transport, carpooling and/or cycling, by the designation of an Employee Transport Coordinator, through their location policy, and/or by adapting work schedules and the organisation of telework. An overview of these measures is followed by an analysis of the Belgian situation. The Belgian 2005 questionnaire Home-to-Work-Travel (HTWT) enables us to make an inventory of mobility management in Belgium. The database HTWT contains information on 7460 worksites. Besides having data on modal split, work regimes and accessibility problems, 38 different mobility management measures are checked in the questionnaire. Given that we assume a relationship between accessibility

[1]Prinsstraat 13, 2000 Antwerp, Belgium and Krijgslaan 281 S8, 9000 Ghent, Belgium, T: +3232654085, F: +3232654395, E: thomas.vanoutrive@ua.ac.be
[2]Chaussée de Binche 151b, 7000 Mons, Belgium and Voie du Romain Pays 34, 1348 Louvain-la-Neuve, Belgium, T: +3265323424, F: +3265315691, E : vanmalderenl@fucam.ac.be
[3]Chaussée de Binche 151b, 7000 Mons, Belgium, T: +3265323293, F: +3265315691, E: bart.jourquin@fucam.ac.be
[4]Voie du Romain Pays 34, 1348 Louvain-la-Neuve, Belgium, T: +3210472136, F: +3210472877, E: isabelle.thomas@uclouvain.be
[5]Prinsstraat 13, 2000 Antwerp, Belgium, T: +3232654221, F: +3232654395, E: ann.verhetsel@ua.ac.be
[6]Krijgslaan 281 S8, 9000 Ghent, Belgium, T: +3292644553, F:+3292644985, E: frank.witlox@ugent.be

problems and sustainable commuting measures both are incorporated in one analysis. Binary exploratory factor analysis (EFA) is used to make a classification and to obtain a better insight in the structure of the variables. However, no strong link between accessibility problems on the one hand and sustainable commuting measures on the other hand could be detected. Despite the absence of this link, a classification of mobility management measures and accessibility problems has been made. This indicates that employers regularly choose to implement a set of related sustainable commuting measures.

Keywords: Belgium; Mobility Management; Sustainable Commuting; Transportation Demand Management (TDM)

1. Introduction

Under the flag of mobility management, a renewed interest has risen for the promotion of sustainable transport. An example is the establishment of the European Platform on Mobility Management (EPOMM) in 2006, as a result of an EU-subsidised project. The aim of this platform is 'to promote and further develop mobility management in Europe' and 'to support the active exchange of information and learning on mobility management between European countries'. Also, the European Commission recognises the potential of mobility management in its Action Plan on Urban Mobility (COM(2009) 490, p. 10) by stating that, 'Company mobility management can influence travel behaviour by drawing the employee's attention towards sustainable transport options. Employers and public administrations can provide support through financial incentives and parking regulations'. Another example of the introduction of mobility management, but this time in the Netherlands in 2007, is the creation of a Taskforce Mobility Management (TFMM). In Belgium, the Federal government and the three regions also have taken a number of initiatives to promote a more sustainable commuting. The federal Belgian parliament decided in 2003 to develop a three-yearly mandatory questionnaire to major employers on mobility management. The basic idea is that the company's works council has to discuss this questionnaire in order to stimulate a debate on how sustainable commuting among employers and employees can be achieved or further implemented. Note that in Belgium a works council is the official (mandatory) body at the company level where an employer discusses a variety of topics with the representatives of the employees. Works councils exist since the late 1940s and play an important role in the social dialogue between employers and unions. The 2003 initiative was however a second attempt. The initial proposals for compulsory commuting plans for companies located in Belgium with more than 50 employees were dropped after the strongly negative reaction of businesses in 1999 (Rye, 1999b; Enoch and Potter, 2003, p. 53). Also important to know is that in Belgium most transport-related policies originate at the regional level. In other words, Flanders, the Walloon region and the Brussels region each play their role in the mobility debate. Of the three regions, only the Brussels capital region requires a mobility plan for every employer with at least 200 employees. Flanders created in 2006 a Commuting Fund which subsidises projects of employers to reduce Single Occupant Vehicle (SOV) commuting. Up till now, 49 projects of companies or groups of companies have been subsidized for a total of more than 15 million euro. Finally, the Walloon region also supports the making of transport plans of companies (Plan de Déplacements d'Entreprises; PDE). Besides government agencies and hospitals, Wallonia also focuses on mobility plans for business parks (Plan de Mobilité de la Zone d'Activités économiques; PMZA). As a result, also small to medium-sized enterprises are involved. In what follows we briefly elaborate on the issue of different initiatives of mobility management schemes and to point to the importance of the employer in this debate.

1.1 The importance of the institutional context for mobility management

In the USA, the term Transportation Demand Management (TDM; Ferguson, 2000) covers about the same issues as mobility management. The renewed interest can be illustrated by using the number of Transportation Management Associations (TMAs) as an indicator. A boom of TMAs could be noted in the late 1980s and early 1990s. Mid 1990 a shake-out was noticed, but many TMAs are thriving in the first decade of the 21st century (Ferguson, 2007). The most striking TDM measures were the mandatory Employer Transport Plans (ETPs) in several jurisdictions in the USA. A well-known example was Regulation XV in the South Coast Air Quality Management District (SCAQMD) in Southern California. Regulation XV required that public and private employers having 100 or more employees at any worksite, complete a plan for that site by which they intend to increase the Average Vehicle Ridership (AVR) (Giuliano et al., 1993). Next to this regulation of the Air Quality Management Plan for the Los Angeles metropolitan area, similar initiatives emerged in New York City, Baltimore, Chicago, Philadelphia, Houston and San Diego (Rye, 1999a). However, after lobbying from businesses, many mandatory ETP regulations disappeared, and Washington State currently possesses the only mandatory statewide commuting trip reduction ordinance in the USA (Rye, 1999b; Enoch and Potter, 2003; Ferguson, 2007).

Comparisons between countries are difficult without the proper background knowledge on the organisation of labour and other institutional factors. The mandatory travel plans in the USA challenges the image of 'North America as a bastion of the free market' versus 'an over-regulated Europe'. Rye (1999b, p. 28) explains the highly regulated American situation by describing it as a political system which is driven by interest groups and a plethora of public agencies at different levels. Deregulation is, according to him, much more comprehensive in the UK. Considerable differences inside the USA also put the mandatory approach into perspective. In the case of the Clean Air Act, the state of California is a forerunner, but there are still several states which prefer a regulatory race to the bottom (also called 'Delawares'; Vogel, 1997), and as stated earlier, most mandatory plans already disappeared. The more voluntary European approach can also be linked to the difference in HRM-practices. Labour legislation has been more advanced in continental Europe and this reduced the opportunity and incentive for European employers to take a more individualized and so-called strategic approach to labour management (Kaufman, 2007). Indeed, especially in continental Europe, HRM-measures, like mobility management initiatives, cannot be decoupled from the collective bargaining tradition. A strong emphasis on collective bargaining can decrease the desirability and need for specific regulations outside the social dialogue. Next to differences in labour legislation, the differences in tax regimes influence commuting behaviour and transport policy. In Belgium, but also in Denmark, Finland, France, Germany, Luxembourg and the Netherlands, commuting is considered as a tax-deductible expense, while in the USA, the UK and several southern European countries, commuting is treated as a personal expense (Potter et al., 2006).

Rye's (1999a) comparison between UK and Dutch employer attitudes to Employer Transport Plans (ETPs) illustrates the differences between countries. The majority of UK employers feel that employee commuting 'lay outside their remit as employers' (p. 188). In the Netherlands, ETPs are more popular, due to the tradition of employer contributions to employee commuting costs, the longer history of ETP development, and the availability of related government funds (p. 194). As a consequence, the national context is of major importance to understand ETP practices.

Belgium has a strong collective bargaining tradition between employees and employers, and transport allowances are often part of the agreements between worker and employer representative organisations, i.e. the collective labour agreements. As a result, regulations in Belgium about public transport and bicycle allowances can differ between the agreements of different economic sectors. Finally, the Belgian taxation regime encourages cycling by making the

cycling allowance tax deductible, but favours at the same time company cars and free fuel cards. Moreover, the possibility to deduct commuting expenses encourages car commuting and trip-lengthening in a major way. The government also supports public transport which is organised by the federal (rail) and regional (bus, tram, metro) governments.

1.2 The importance of the employer in mobility management

Most of the aforementioned mobility management initiatives focus on the employer. However, the focus of commuting and SOV-alternatives research is mainly on the individual commuter (Cao and Mokhtarian, 2005; Van Acker and Witlox, 2010) or on aggregated spatial units, like municipalities (Rietveld and Daniel, 2004; Verhetsel et al., 2010; Boussauw et al., 2010), while less attention goes towards the role of the employer. Nevertheless, employers influence the commuting behaviour of their employees in many ways. It is known from literature that firm location, work schedules and mobility management initiatives have a significant impact on travel behaviour (Giuliano et al., 1993; Ferguson, 2000; Hendricks and Georggi, 2007). To explore the distribution of mobility management practices, this paper aims to give an overview of mobility management initiatives using the Database Home-to-Work-Travel (HTWT) which contains data of all major employers located in Belgium. The analysis of this database is part of the ADICCT project (Assessing and Developing Initiatives of Companies to control and reduce Commuter Traffic) which is financed by Belgian Science Policy in the Science for a Sustainable Development research programme. In the present paper, an Exploratory Factor Analysis (EFA) is used to make a classification of sustainable commuting measures and accessibility problems. The large dataset (n= 7460) enables us to go beyond research based on a limited number of cases. The results can be used as a reference for future more in-depth analyses of mobility management by Belgian employers. Parallel research will explain the modal split at workplaces and detect best practices of mobility management.

The paper is organised as follows. First, we give an overview of mobility management measures, subdivided in measures directed to promote an alternative mode, alternative work schedules, parking policy and company cars, location strategies, and the designation of an Employee Transport Coordinator (ETC). Second, we discuss the Belgian Database Home-to-Work-Travel, which is a unique source for data on employer mobility management. Third, the results of the exploratory factor analysis (EFA) are given and discussed. Finally, we end with a conclusion.

2. An overview of mobility management measures

In this section, we give an overview of mobility management measures. Table 1 shows that our grouping largely corresponds with the list given in Rye (2002, Table 1, p. 288). In contrast with Rye, we do not take on board 'walking' as our dataset lacks information on walking measures, but we add location strategies as an additional category. The absence of walking measures seems a minor disadvantage as these measures are rare and only relevant for employees who live close to their work.

2.1 Promoting alternative modes

Cycling receives much attention of transport planners since it is an emission-free way of transport. Besides the common mode choice factors, like car ownership, income, education, class and age, also topography, meteorological conditions and distance influence bicycle use (Comsis Corporation, 1993; Rodriguez and Joo, 2004; Parkin et al., 2007).

Common employer initiatives to encourage cycling are a cycle mileage allowance, the delivery of information on cycling routes, promotion events like a 'Ride to Work Day', and the creation of facilities, like showers, changing rooms and secured bicycle parking (Kingham et al., 2001;

Dickinson et al., 2003; Gatersleben and Appleton, 2007; Rose and Marfurt, 2007). In general, employers view the provision of facilities for cyclists as acceptable and low-cost, in contrast with the less common provision of (pool) cycles and assistance with buying cycles (Rye, 1999a). However, the mobility management focus on cycling infrastructure neglects the underlying problems like distance and trip complexity. Therefore, many initiatives can merely be seen as a treatment of the symptoms (Dickinson et al., 2003; Cupples and Ridley, 2008).

Table 1. Overview of employer initiatives that influence employee travel behaviour

Mobility Management measure	This study	Rye (2002)
Promoting alternative modes	-cycling -carpooling -public transport	-cycling -car share -public transport -walking
Promoting the car	-parking -company cars	-parking -new conditions of employment
Work schedules and telecommuting	-compressed workweeks -flexible work schedules -telecommuting	
Location strategies	-workplace (re)location	-
Employee Transport Coordinator	-ETC	-overall for whole plan

Carpooling is the next SOV alternative, and it encompasses that two or more employees drive together to work in a private or company car. Especially in the USA, car and van pooling 'traditionally has been the backbone of most TDM programs' (Rye, 1999b; Ferguson, 2000, p. 81). The carpool alternative looks attractive due to the reduced costs per commuter, the relative door-to-door directness and a comfort level most nearly like that of the SOV (Tsao and Lin, 1999). However, commuters perceive car sharing also as an unreliable alternative as they are dependent on someone else. Moreover, Rietveld et al. (1999) report that on average, carpooling leads to a travel time increase of 17 % compared with solo driving. The pick-up/drop-off delay and extra travel and waiting time make carpooling less suitable for short distances. The lack of flexibility and the loss of privacy seem also important discouraging factors. Finally, the availability of potential carpool partners which share both the same origin and destination zone is limited, especially in low-density areas (Hwang and Giuliano, 1990; Comsis Corporation, 1993; Tsao and Lin, 1999; Kingham et al., 2001).

In general, employers perceive the encouragement of car-sharing as a low cost, and thus acceptable, measure. An emergency ride home service and the organisation of car-sharing/minibus pooling are ranked more than averagely acceptable/effective by UK employers (Rye, 1999a; 1999b). An emergency ride home or guaranteed ride home is not necessarily limited to carpooling. However, it is mostly applied in the context of carpooling. While Giuliano et al. (1993), Rye (1999a; 1999b), Kingham et al. (2001) and Menczer (2007) classify the 'guaranteed ride home' as effective, Hwang and Giuliano (1990) identified it as less effective. Preferential parking, alternative work hours, a matching service, and marketing are also pointed as less effective, in contrast with the more effective parking charges and restrictions, and transport allowances. This is in line with the general finding that sticks proved to have a greater influence on mode choice than the carrots (O'Fallon et al., 2004).

When considering public transport, rail is generally considered as an alternative for longer commutes, whereas the bus, tram and metro fit better with shorter distances. The success of

public transport is highly dependent on the supply, of which the distance to a stop and the frequency of service are the most determining factors (Blauwens et al., 2008; Vandenbulcke et al., 2009). As a result, rail is more attractive in high-density areas, which have good public transport facilities and suffer from congestion and parking problems (Limtanakool et al., 2006). According to Kingham et al. (2001), the most important features that may encourage car-users to shift to using public transport are frequency, reliability, convenient drop off sites, better connections and discount tickets, while security, more comfortable vehicles and better information are somewhat less important factors.

Promoting the use of public transport is perceived by employers as a more than average acceptable measure (Rye, 1999a). 'Promotion of public transport at the workplace by making information and tickets easily available, and by selling season tickets through wage-packets' are measures requiring low levels of resource and/or intervention, while demanders of moderate levels are 'subsidizing public transport tickets and/or services to and from the site' (Rye, 1999b). Limtanakool et al. (2006, p. 339) assume a low degree of effectiveness of measures that aim to switch commuters from car to rail, given the high, positive cross elasticities in travel time for commuting trips. On top of this, public transit suits less with complex trips (Chen et al., 2008; De Witte et al., 2008).

2.2 Parking policy and company cars

To attract employees, employers often deliver free parking and company cars, which both strongly influence mode choice (O'Fallon et al., 2004). Despite recent tax reforms based on environmental and transport objectives, taxation regimes in many countries make company cars and fuel cards an attractive instrument for employers to reward employees. As a consequence, company cars are increasingly part of the 'remuneration package', and are thus not a tool of the company's transport policy (Potter et al., 1999; Enoch and Potter, 2003; Potter et al., 2006). Kingham et al. (2001, p. 159) conclude that 'As long as companies provide free cars and fuel people are unlikely to be persuaded to leave their cars at home for the journey to work'. Moreover, tax regimes with a deduction for commuting expenses stimulate commuting by car, and form an incentive to live further from work (Potter et al., 2006).

Next to company cars, employer-provided parking is a major disincentive for sustainable commuting. Preferential parking for ridesharers is the least controversial parking measure, while parking cash-out payments are often a contentious HRM issue. A cash-out system implies that commuters can choose for a 'free' parking space, or for the cash equivalent when they use an alternative transport mode. Parking charges and restrictions are mentioned as one of the most effective mobility management initiatives, however, many managers view charging for employee parking as 'a move whose industrial relations implications are too severe to contemplate' (Rye, 1999b, p. 20). As a consequence, parking charges and restrictions are rare in TDM programs, despite the tax exempt for parking cash-out payments in the USA (Giuliano et al., 1993; Rye, 1999a; Potter et al., 2006). Note that state laws can require the cashing out of employer-paid parking for some employers in certain areas, like in California's Parking Cash-Out Program (Shoup, 1997; ARB, 2009). Logically, parking cash-out systems are more common in these areas. Somewhat ironically, parking shortage is often the initiator for the establishment of an Employer Transport Plan (Rye, 1999a).

2.3 Work schedules and telecommuting

The main aim of alternative work schedules is a better fit between the professional and personal activities of employees (Hung, 1996; Brewer, 1998). Since work regimes affect the activity patterns of employees, they also influence the commuting behaviour of these employees. In general, schedule flexibility enlarges the choice set of commuters (Chorus et al., 2006), but in most cases, changing work schedules are part of a general HRM strategy apart from the company's mobility

policy. In what follows we analyse three main categories of alternative work hours: (i) compressed workweeks, (ii) flexible work schedules, and (iii) teleworking and telecommuting. The latter implies organisational changes and is therefore discussed together with work schedules, and thus not with the location strategies (Brewer, 1998).

Flexible work schedules avoid that workers commute all at the same time, i.e. during the rush-hours. Another advantage of flexitime is that staff can fit their work schedule better to the public transport schedules. However, flexitime does not reduce the number of commuting trips, and is less beneficial for carpooling than a regular work schedule, due to the fact that it is less easier to find carpool partners with the same working hours (Hwang and Giuliano, 1990; Hung, 1996; Rye, 1999b). The use of flexible work schedules suits better with the activities of white-collar workers than with those of employees in manufacturing with a more stringent coordination (Hung, 1996, p. 11-12).

The compressed working week (CW) encompasses fewer working days a week together with an extension of daily work times. As a result, employees work the same number of hours, but with fewer home to work displacements. In contrast with flexitime, compressed work weeks thus reduce the number of commuting trips. Furthermore, longer working days may shift the moment of commuting out of peak hours (Hung, 1996; Sundo and Fujii, 2005, p. 836).

Teleworking encompasses all work-related substitutions of telecommunications for travel, while telecommuting concerns its impacts on daily commuting to and from work (Mokhtarian, 1991; Helminen and Ristimaki, 2007). The rationale is that information exchange using Information and Communication Technologies (ICT), replaces trips. However, the effect of telework on transport remains unclear, despite the abundant literature on this topic (Mokhtarian, 1991; Mokhtarian, 1998; Tayyaran and Khan, 2003; Choo et al., 2005; Bergum, 2007). A noted counterproductive effect is the agreement of telecommuting employees with longer travel distances, due to the reduced number of commuting days. As a consequence, telecommuting can encourage urban sprawl. In the other case, employees telework part of the day to avoid the rush hour, while maintaining the same number of trips.

2.4 Location strategies

The location of a worksite is an important determinant for the commuting behaviour of employees (Van Acker et al., 2007; Verhetsel and Vanelslander, 2010). Relevant factors are the accessibility of the workplace by public transport, land-use mix, density, and congestion levels. As a consequence, the location or relocation decision of a company influences modal choice and travel distance, especially when a workplaces moves out of the city centre (Naess and Sandberg, 1996; Aarhus, 2000). Therefore, the implementation of a Travel Plan is sometimes required in the planning permission for the development of a site (Rye, 1999b; Enoch and Potter, 2003; Hull, 2005; Roby, 2010). A more comprehensive approach is the so-called 'ABC' location policy in the Netherlands which aimed at a better match between the accessibility profiles of business sites and the mobility profiles of firms. However, the original 'ABC' policy has been rescinded and replaced for a weakened version. Such a location policy is mainly directed towards the long term since it affects only new investments. A forced relocation policy is not feasible, and also not very effective in terms of traffic reduction. But a good location policy that guides employer location choices, can have significant effects on traffic demand (van Wee and van Der Hoorn, 1996; Aarhus, 2000). In general, employee accessibility is an important location decision factor for employers, whereby car accessibility prevails, but in the case of major office buildings, public transport facilities do matter as well.

2.5 Employee Transport Coordinator

An Employee Transport Coordinator (ETC) is a staff member who has to facilitate the implementation of mobility management measures. The designation and training of an ETC was for instance mandatory under Regulation XV in Southern California (Giuliano et al., 1993). However, 'the staff who had taken on this role were low on the organizational hierarchy, could only work part-time on the ETP and, in most cases, had been required to take on the role rather than being actively interested in it' (Rye, 1999b, p. 16). In the UK, appointing an employee transport co-ordinator in an organisation is rare, and employers do not perceive it as an acceptable and effective mobility management measure. Hence, management commitment to the ETP is as important as the designation of an ETC (Rye, 1999a). According to Hendricks and Georggi (2007, p. 95), an ETC should operate at 'managerial level with direct communications access to top management decision-makers' and should have 'influence on decisions relating to the trip reduction program budget'. Especially for worksites located in areas with poor access to transport alternatives, management support and an effective ETC are necessary for an effective ETP. An ETC may play a crucial role in the delivery of information to employees in order to remove negatively biased perceptions of SOV alternatives (Chorus et al., 2006). The skills of successful ETCs may differ between companies, as corporate culture, mobility plan maturity and industrial relations differ among employers as well. Similarly, there is no chosen department under which the mobility manager should fall (Hendricks and Georggi, 2007; Roby, 2010).

3. Data and Method

In the previouss section we discussed the ways in which employers influence the travel behaviour of their employees. We will now turn to the Belgian situation and explore the employer initiatives that try to influence employee commuting.

3.1 Data: the Belgian database Home To Work Travel (HTWT)

As a result of a Belgian law of 2003 a new important source of data is available about home-to-work displacements of employees. This law obliges every employer with at least 100 employees to fill in a questionnaire for every worksite with at least 30 employees. The first questionnaire dates from 2005 and contains questions about mobility management measures, modal split and accessibility problems. The goal of these new regulations is twofold. On the one hand the government wants to collect information about the home-to-work-travel to underpin their mobility policies; on the other hand, there is the obligation to discuss the questionnaire in the works council. The objective of the latter is the creation of a platform among the social partners which can lead towards a company mobility plan, or at least to measures which support a more sustainable commuting. The Federal Public Service Mobility and Transport organises the questionnaire, which could be filled in on the Internet. The administration sent several reminders, both electronically and on paper. Especially in the public sector, problems with the Crossroads Bank for Enterprises (CBE) code made that 36 % of the total number of questionnaires were returned on paper. The overall response rate is estimated at 85-90 % (FOD Mobiliteit en Vervoer, 2007). The questionnaire HTWT is ten pages long and consists of following parts:

- -identification of the workplace: number of employees, address, economic sector
- -work schedules: number of employees with fixed, flexible or irregular work schedules, or which work in shifts
- -modal split: number of employees which use a given mode (main commuting mode: SOV, carpooling, rail, MTB (metro, tram or bus), transport organised by employer, bicycle, motorbike or –cycle, walk, or other)

- -mobility management on the site (see list in Table 3)
- -accessibility of the workplace; accessibility problems (see list in Table 4)

The 2005 database HTWT contains 7460 worksites with at least 30 employees which employ 1 342 119 employees in total. To compare, the total number of employed people in Belgium was about 4 235 000 in 2005. Figure 1 shows the locations of the workplaces in the database HTWT. Unsurprisingly, worksites concentrate in agglomerations and cities. Following the classification of municipalities of Luyten and Van Hecke (2007), more than one third (37.9 %) of the sites are located in central cities and 57.1 % in agglomerations (including the central cities).

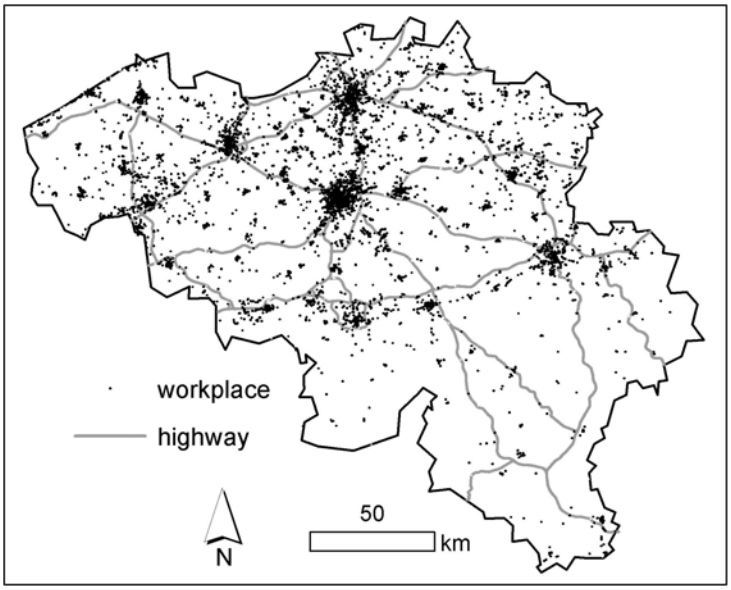

Figure 1. Locations of the workplaces in the Belgian database HTWT 2005

The renewed mobility policy focus on employers, strengthen the need for data at the workplace level. Common data sources, like the 2001 Belgian census (Verhetsel et al., 2010) and the Flemish regional travel survey (*Onderzoek Verplaatsingsgedrag Vlaanderen* (OVG); Van Acker et al., 2007), lack information on the workplace and employer mobility management. Furthermore, the three-yearly character of the questionnaire HTWT opens perspectives for future panel research, and its mandatory character overcomes common sample biases, but not all of them. The fact that 'other' questions tend to form a distinct factor in the factor analysis (see further), indicates that the data may depend on the person or company who filled in the questionnaire. Note here that the discussion of the questionnaire in the works council of the company may act as a quality check. When comparing the content of the questionnaire with the given overview of mobility management measures, information on company cars seems to be the largest gap. Only one question mentions company cars: 'point of interest: costs of company cars'. Ongoing political discussions about the role of company cars in transport-related problems, could explain the limited attention given to this topic in an official questionnaire. Other complex topics summarised in one question are the presence of telework, and the designation of an Employee Transport Coordinator (ETC). Finally, the lack of data on individual employees is a general shortcoming of workplace-oriented data (Hendricks and Georggi, 2007).

3.2 Method

The database HTWT contains a large quantity of data. As a consequence, we need a technique to summarize the myriads of variables and observations. Since we can easily assume that our

variables are related, factor analysis may reduce the number of variables by transforming them into fewer unobserved factors. In short, factor analysis simultaneously minimizes the number of factors (variables) and the loss of information. The resulting factor loadings indicate for each variable the degree of correlation with the constructed factor. Accordingly, variables with similar factor loadings are related and this property allows detecting patterns in large databases. Since the aim is the exploration of a dataset, Exploratory Factor Analysis (EFA) is used which set no restrictions on the factor loadings, in contrast with confirmatory factor analysis by which some factor loadings are constraint to be zero (Stevens, 2002). Given we assume a relationship between accessibility problems and sustainable commuting measures both are incorporated in the analysis. Employers could indicate 38 different sustainable commuting measures and 29 remarks on accessibility problems in the questionnaire, which results in 67 binary variables. The binary nature of the data violates the normality assumption of linear factor analysis. Therefore binary (as a special case of categorical) factor analysis is used. This method is very similar to standard factor analysis, but allows to handle binary data in a correct way (Nisenbaum et al., 2004; Muthén and Muthén, 2006).

In addition to the mobility management measures and accessibility remarks, some other variables supplement the analysis. The first dummy variables specify that at least 5 % of the workforce on a site has respectively fixed, flexible or irregular working times, or works in shifts. The next four variables indicate the size of a workplace and contain the categories less than 50, from 50 to 99, from 100 to 199, and more than 199 employees. As a third category, dummy variables indicate if a workplace is located in a central city, in an agglomeration (excluding the central city), in the urban fringe or in the outer area of a Standard Metropolitan Labour Area. For this purpose, the classification of Belgian municipalities made by Luyten and Van Hecke (2007) is used. The last four dummy variables identify worksites in respectively manufacturing (D), wholesale and retail; repair of motor vehicles and consumer goods (G), finance (J) and the public sector (Z). These are the economic sectors with the most distinctive characteristics. The mobility management measures noted as 'other' are excluded from the analysis since they tend to form a separate factor. This indicates that an employer who filled in the 'other' category once, often filled in 'other' under questions further on in the questionnaire.

In factor analysis, the so-called scree plot shows the eigenvalues, and notable drops in eigenvalues are used to select the number of factors used in the analysis. In our case, the scree plot showed two major twists, one at five factors and one at ten. The corresponding root mean square residuals were respectively 0.098 and 0.079. A value of 0.05 or less indicates a good fit of the model, while values up to 0.08 suggest a reasonable fit (Stevens, 2002, p. 433). A model with 10 factors was chosen because the factors in a 5-factor model were too heterogeneous. Table A (in Annex) shows the results of this analysis. Some factors are still heterogeneous in the 10-factor model, but there was enough differentiation to interpret the results. The number of factors is already high and the slope of the scree plot quite flat, as a consequence, the higher amount of explained variance by the addition of more factors would not compensate the higher complexity. The goal of the analysis is an exploration of the data; therefore the relative low, however reasonable, amount of variance covered by the ten factors is not a major shortcoming. An 11-factor model with the mobility management measures and the accessibility problems, but without the first 16 variables in Table A (economic sector, size, type of municipality and work regimes) brings along the same classification as the one presented here. The 'other' questions formed an extra factor in the 11-factor model and were therefore excluded in the selected model. The comparison with this and some other analysis set-ups was thus a good check for the stability of the results.

4. Results and Discussion

Table 2 describes the factors from which the factor loadings are given in Annex, together with the frequencies of the mobility management measures. This description of the factors confirms the literature (Hung, 1996) that in (central city) office-type settings flexitime is suitable since the coordination of activities is less strict than in manufacturing. Also the relation between telework and offices is not surprising as tasks typical for offices can more easily be done from another location. Moreover, the higher real estate costs for offices makes of telework a workspace- and thus cost-saving measure. A second group of workplaces typical for central cities are the public transport-oriented workplaces of the public sector, with fixed or flexible work schedules. Fixed work schedules and shifts are unsurprisingly connected to the major manufacturing sites outside the central cities. These sites organise more than average their own employee transport. Finally, irregular work schedules form a cluster with small worksites of the retail sector, located around the central cities.

Table 2. Description of the EFA factors

factor	positive factor loadings	negative factor loadings
1	-public sector; central cities; fixed work schedules; advanced bicycle measures	-retail; agglomerations
2	-	-accessibility problems
3	-public sector; relocation of workplace; promotion of public transport; financial measures	-manufacturing; bad accessibility by public transport; employer transport
4	-	-finance; mobility management measures; values
5	-small sites; irregular work schedules; retail	-manufacturing; fixed work schedules & shifts; large sites
6	-no space for bicycle facilities; small sites	-bicycle measures
7	-finance; central cities; flexible work schedules; telework; carpool database; large sites	-fixed & irregular work schedules, shifts; outer areas; manufacturing & retail
8	-employer transport; bicycles at station; guaranteed ride home; urban fringe	-collaboration with government
9	-small sites	-
10	-fixed work schedules; parking charge	-values; divers remarks on accessibility; information & collaboration; flexible work schedules; public sector; advanced bicycle measures;

However, the main outcome of the present study is not a classification of workplaces, but a better insight in the distribution of mobility management measures and transport-related problems in Belgium. Therefore, Tables 3 and 4 give an overview of the variables and their corresponding frequencies, together with the classification of mobility management measures and accessibility problems. This grouping of variables is based on the factor loadings exceeding 0.4 (or 0.3), while for subcategories also lower values are taken into account. For some variables, a look at the content helped to classify them in the right category. Despite this source of arbitrariness, the main categories are based on the EFA outcomes. The last column of Table 3 indicates which variables could be part of several categories.

Table 3. Classification of mobility management measures

main category	most important factor	sub-category	2nd most important factor	description	%	related category
bicycle measures	-6	advanced bicycle measures	1; -4	bicycles available for work trips	9.2	
				improvement of infrastructure	2.9	
				rain clothes	1.6	
				bicycle maintenance	1.3	
				bicycles available for home-to-work travel	0.8	
		bicycle facilities		covered bicycle storage	34.9	
				secured bicycle storage	28.7	
				showers	24.1	
				changing room	23.4	
				additional allowance for work trips by bike	7.2	
				bicycle repair facilities	3.1	
				bicycles available at the railway station	0.6	employer trans.
divers measures	-4	carpool measures		organisation of a carpool	5.2	
				linking to a central carpool database	4.6	telework
				preferential parking for carpool	1.9	
				guaranteed ride home	1.6	
		public transport measures	1; -6	information on public transport	9.8	
				encouraging public transport for work trips	6.8	financial
				regular consultation with public transport company	5.1	
		information & collaboration	-10	regular consultation with local authorities	8.2	
				information on SOV-alternatives	6.4	
				collaboration with regional & local mobility institutions	6.0	
				distribution of information about carpool	4.2	
				mobility coordinator	3.6	
				information on cycling routes	2.9	
				obligation to make an ETP	2.6	values
				collaboration with other enterprises or chamber of commerce	2.3	
				regional or local financial measures	1.4	
		financial measures	3	additional cycling fee	42.8	
				supplementary allowance for public transport	23.8	
				parking charge	0.7	
		relocation	-6; -1	relocation fee	0.6	adv. bicycle
				relocation of the site	0.5	financial
telework	7			telework	6.0	carpool d-base

Table 4. Classification of problems with and remarks on accessibility

main category	most important factor	subcategory	2nd most important factor	description	%
low accessibility	-3	low accessibility public transport	-2	public transport service not adapted to work hours	27.9
				no or insufficient public transport service	25.7
				public transport travel time	19.8
				distance to public transport stop	15.2
		employer transport	8; -10	transport organised by employer (van, bus,...)	4.6
				cost for company cars	4.0
				cost of transport organised by the employer	3.5
		recruiting problems		recruiting problems due to bad accessibility	3.7
agglomeration problems	-2	public transport quality	-8	low quality, safety and comfort	7.8
		congestion	-1; 7	congestion	26.1
		dangerous traffic	-3; -10	dangerous traffic (bicycle)	37.3
				dangerous traffic (car)	14.4
				unsafe routes	7.6
		unsafe neighbourhood		unsafety (social)	6.0
				feeling unsafe in the neighbourhood	5.8
				feeling insecure due to work hours	5.8
		space shortage	6	no showers	18.8
				no possibilities for secured bicycle storage	10.4
		parking	8	insufficient number of parking places	25.6
				high parking costs for employer	4.6
		image	-3	company image (bicycle)	1.5
values	-10			protection of the environment	9.8
				positive collaboration between employers and employees	8.1
				health of employees	6.5
				equality among users of different transport modes	6.0

The frequencies in Table 3 reveal that most mobility management measures are only present at few worksites. Bicycle facilities on the other hand, are more common. This is in line with the literature which reports that employers view the provision of facilities as acceptable and low-cost measures. Cycle and public transport allowances are also common at Belgian worksites. Tax exemptions for such financial measures are one reason for their success, next to subsidies for public transport tickets. On top of that, allowances are often part of collective labour agreements. Accordingly, commuting costs are perceived as a part of the remuneration package of Belgian employees, just like company cars. For the USA, Giuliano et al. (1993) could state that monetary incentives are rare in TDM programs because they are costly and often controversial. Mandatory parking cash-out requirements are therefore a noted exception (Shoup, 1997; ARB, 2009). In

contrast, both the Belgian taxation regime and the social bargaining system explain the relative success of transport allowances. Apart from the specific result for transport allowances, the data confirm the general finding that employers prefer to implement the least costly measures, like bicycle storage (Rye, 1999a; 2002; Dickinson et al., 2003).

The main conclusion of the EFA is the absence of a pronounced link between on the one hand mobility management measures, and on the other hand accessibility remarks and problems. However, it is assumed that companies confronted with accessibility and mobility problems are the first to invest in mobility management (Rye, 1999a). At first glance, the implementation of mobility management at Belgian workplaces seems thus to fall outside rational firm behaviour, but as Rye (1999a, p. 20) states, the often altruistic goal of transport plans 'is not their *raison d'être*'. Indeed, transport policy seems to be the preferred tool to fulfil demands outside the field of transport (Blauwens et al., 2008), like human resource related issues. Nevertheless, the results of the EFA are useful to make a classification of mobility management measures and accessibility problems. The fact that a classification could be made, indicates that employers regularly take a set of similar measures.

When looking at the resulting groups of mobility management measures, the categories mentioned in the overview (Table 1) can largely be recognised. The first column of Table 3 shows the main categories, and the subcategories are given in the third column. Measures that promote a certain mode are the first category. Two distinct types of bicycle measures appear, the more common facilities and the more advanced measures like the provision of bicycles and their maintenance. The two other groups of measures that promote a certain mode are respectively carpool-oriented and public transport-oriented initiatives. Furthermore, financial measures, and information and collaboration form distinct categories, apart from the mode they try to promote. The remaining measures are more difficult to classify. Telework is linked to one factor (factor 7), and is related to the major workplaces of the financial sector, located in central cities, where flexible work schedules are common. The factor loadings for telework corresponds best with those of the carpool database variable. Indeed, both are ICT-based measures and could logically be linked to the group containing the financial sector, large office buildings, locations in central cities, and flexible work schedules. Two other (groups of) variables with similar results are the fee for employees who move closer to their workplace, and the advanced bicycle measures. A possible explanation is that a moving fee tries to overcome the underlying distance problem, i.e. moving people to residences within a 'cyclable' distance. However, also the rarity of these measures can contribute to their similar factor loadings. The aforementioned employee moving fee may also be linked to another location measure, the relocation of the site itself. The factor loadings of site relocation also correspond with those of the financial measures. These are all costly measures of which we can assume a higher popularity among employers willing to make real investments in mobility management.

The two main groups of accessibility-related remarks (Table 4) are on the one hand problems typical for agglomerations, and on the other hand a low accessibility by public transport. Agglomerations suffer from parking problems, traffic congestion and criminality (Glaeser, 1998), and since they have better public transport facilities the second category of low public transport accessibility can be seen as the counterpart of the 'agglomeration problems'. The low accessibility category can be subdivided in public transport-related accessibility problems, items related to transport organised by the employer, and recruiting problems. Finally, four general values (health, equality, collaboration and the environment) form a distinguished group.

The exploration of the database HTWT gives an overall picture of mobility management practices at large workplaces located in Belgium. Ongoing research will focus on the commuting modal split at worksites, and will lead to a framework to evaluate individual case studies. Nevertheless, some remarks can already be made on the existing questionnaire. A first issue is the lack of data on company cars, notwithstanding their role as major SOV stimulus. Second, the broad range of

telework practices (Mokhtarian, 1991; Helminen and Ristimaki, 2007) is only covered by one yes or no question. Third, additional questions on the position and budget of the ETC (relations with management; Hendricks and Georggi, 2007), and the maturity of the Employer Transport Plan (Roby, 2010) could enrich the database. A last set of factors which are absent in the questionnaire, relates to the commuting trip itself. Commuting distance, access and egress modes of transport, and individual employee characteristics in general (e.g. gender and age) could further contribute to the completeness of the dataset.

Besides the comments on the database HTWT given above, some other findings about mobility management in Belgium may contribute to the future analysis of the data. First, commuting is not the core business of companies (Kingham et al., 2001; Enoch and Potter, 2003). Accordingly, low-cost measures dominate and the more expensive initiatives are often taken to reach goals outside sustainable transport policy. In Belgium, the social dialogue between employees and employers probably influences mobility management more than transport policy itself. A straightforward analysis which assumes a simple link between accessibility problems and the taking of mobility management actions, and between actions and SOV use, will thus overlook the complexity of commuting and transport policy. Second, employers are not the only actor in commuting. A multitude of government agencies and policies influences commuting. Indeed, taxation regimes, public transport companies, mobility management subsidies, parking policies, spatial planning provisions and the personnel management of public bodies, all influence the effectiveness of mobility management by employers. Logically, several studies stress the importance of policy packages and integrated transport planning (Marshall and Banister, 2000; O'Fallon et al., 2004; Hull, 2005). As a result, the formulation of policy recommendations cannot be limited to the employer level. Finally, workplaces differ. We detect differences between office buildings of the financial sector in the central cities, large manufacturing plants outside these cities and retail sites in the urban fringe. Hence, analyses have to incorporate the location of a worksite and the economic sector it belongs to.

5. Conclusion

Mobility management seems to be the established term for sustainable transport policies in Europe. With this, the focus is again on the role of employers in employee commuting. The literature describes several types of mobility management measures taken by employers. Our overview illustrates that the sustainable commuting measures that employers can take are many and divers. We made a classification of these measures on the basis of an exploratory factor analysis, using the Belgian 2005 questionnaire Home-to-Work-Travel (HTWT). We also incorporated a list of accessibility problems in the analysis, however no pronounced relation between problems and measures was found. Nevertheless, we can conclude that the Belgian database HTWT now offers many opportunities for commuting research and the analysis of mobility management.

We also conclude that mobility management research with an employer focus should account for the location and activity sector of a workplace. Furthermore and relevant for the formulation of policy recommendations, the wider context is of major importance. Taxation, spatial planning, parking, labour and public transport policies all interfere with mobility management initiatives. Moreover, the reasons why measures are taken often not correspond with the official goal of sustainable transport. Especially in Belgium, the social dialogue between employees and employers might play a role in commuting behaviour. Despite these remarks, inciting employers to invest in mobility management remains a laudable strategy.

Acknowledgements

This research is conducted within the ADICCT-project (Assessing and Developing Initiatives of Companies to control and reduce Commuter Traffic) which is financed by Belgian Science Policy in the Science for a Sustainable Development research programme. We are also grateful to the Belgian Federal Public Service Mobility and Transport for delivering data and information. Finally, we wish to thank the three anonymous reviewers for their constructive suggestions. All remaining errors are ours.

References

Aarhus, K. (2000). Office location decisions, modal split and the environment: the ineffectiveness of Norwegian land use policy. *Journal of Transport Geography*, vol. 8, no. 4, pp. 287-294.

ARB (2009). *California's Parking Cash-Out Program – An Informational Guide For Employers*. California Environmental Protection Agency – Air Resources Board (ARB), Sacramento.

Bergum, S. (2007). What has happened to telework? Failure, Diffusion or Modification?. *The Journal of E-working*, vol. 1, pp. 13-44.

Blauwens, G., De Baere, P., and Van de Voorde, E. (2008). *Transport Economics*. Third Edition, Uitgeverij De Boeck, Antwerp.

Boussauw, K., Neutens, T., and Witlox, F. (2010). Minimum commuting distance as a spatial characteristic in a non-monocentric urban system: the case of Flanders. *Papers in Regional Science,* (accepted for publication).

Brewer, A. M. (1998). Work design, flexible work arrangements and travel behaviour: policy implications. *Transport Policy*, vol. 5, no. 2, pp. 93-101.

Cao, X. and Mokhtarian, P. L. (2005). How do individuals adapt their personal travel? A conceptual exploration of the consideration of travel-related strategies. *Transport Policy*, vol. 12, no. 3, pp. 199-206.

Chen, C., Gong, H., and Paaswell, R. (2008). Role of the built environment on mode choice decisions: additional evidence on the impact of density. *Transportation*, vol. 35, no. 3, pp. 285-299.

Choo, S., Mokhtarian, P. L., and Salomon, I. (2005). Does telecommuting reduce vehicle-miles traveled? An aggregate time series analysis for the US. *Transportation*, vol. 32, no. 1, pp. 37-64.

Chorus, C. G., Molin, E. J. E., and van Wee, B. (2006). Travel information as an instrument to change car-drivers' travel choices: a literature review. *European Journal of Transport and Infrastructure Research*, vol. 6, no. 4, pp. 335-364.

Comsis Corporation (1993). *A guidance manual for implementing effective employer-based travel demand management programs*, The Institute of Transportation Engineers, Washington.

Cupples, J. and Ridley, E. (2008). Towards a heterogeneous environmental responsibility: sustainability and cycling fundamentalism. *Area*, vol. 40, no. 2, pp. 254-264.

De Witte, A., Macharis, C., and Mairesse, O. (2008). How persuasive is 'free' public transport? A survey among commuters in the Brussels Capital Region. *Transport Policy*, vol. 15, no.4, pp. 216-224.

Dickinson, J. E., Kingham, S., Copsey, S., and Hougie, D. J. P. (2003). Employer travel plans, cycling and gender: will travel plan measures improve the outlook for cycling to work in the UK?. *Transportation Research Part D: Transport and Environment*, vol. 8, no. 1, pp. 53-67.

Enoch, M. and Potter, S. (2003). Encouraging the commercial sector to help employees to change their travel behaviour. *Transport Policy*, vol. 10, no. 1, pp. 51-58.

FOD Mobiliteit en Vervoer (2007) *Diagnostiek Woon-Werkverkeer van 30 juni 2005 – Eindverslag,* Federale Overheidsdienst Mobiliteit en Vervoer, Brussels.

Ferguson, E. (2000). *Travel Demand Management and Public Policy,* Ashgate, Aldershot, UK.

Ferguson, E. (2007). Transportation Management Associations: A Reappraisal. *Journal of Public Transportation*, vol. 10, no. 4, pp. 1-26.

Gatersleben, B. and Appleton, K. M. (2007). Contemplating cycling to work: Attitudes and perceptions in different stages of change. *Transportation Research Part A-Policy and Practice*, vol. 41, no. 4, pp. 302-312.

Giuliano, G., Hwang, K., and Wachs, M. (1993). Employee trip reduction in Southern California: First year results. *Transportation Research Part A: Policy and Practice*, vol. 27, no. 2, pp. 125-137.

Glaeser, E. L. (1998). Are cities dying?. *Journal of Economic Perspectives*, vol. 12, no. 2, pp. 139-160.

Helminen, V. and Ristimaki, M. (2007). Relationships between commuting distance, frequency and telework in Finland. *Journal of Transport Geography*, vol. 15, no. 5, pp. 331-342.

Hendricks, S. J. and Georggi, N. L. (2007). Documented Impact of Transportation Demand Management Programs Through the Case Study Method. *Journal of Public Transportation*, vol. 10, no. 4, pp. 79-98.

Hull, A. (2005). Integrated transport planning in the UK: From concept to reality. *Journal of Transport Geography*, vol. 13, no. 4, pp. 318-328.

Hung, R. (1996) Using compressed workweeks to reduce work commuting. *Transportation Research Part A-Policy and Practice*, vol. 30, no. 1, pp. 11-19.

Hwang, K. and Giuliano, G. (1990). *The Determinants of Ridesharing: Literature Review*, UCTC, Berkeley, California.

Kaufman, B. E. (2007). The development of HRM in historical and international perspective. in *The Oxford handbook of human resource management*, P. F. Boxall, J. Purcell, and P. M. Wright, eds., Oxford University Press, Oxford, pp. 19-47.

Kingham, S., Dickinson, J., and Copsey, S. (2001). Travelling to work: will people move out of their cars. *Transport Policy*, vol. 8, pp. 151-160.

Limtanakool, N., Dijst, M., and Schwanen, T. (2006). The influence of socioeconomic characteristics, land use and travel time considerations on mode choice for medium- and longer-distance trips. *Journal of Transport Geography*, vol. 14, no. 5, pp. 327-341.

Luyten, S. and Van Hecke, E. (2007). *De Belgische Stadsgewesten 2001*, Statistics Belgium Working Paper, Brussels.

Marshall, S. and Banister, D. (2000). Travel reduction strategies: intentions and outcomes. *Transportation Research Part A-Policy and Practice*, vol. 34, no. 5, pp. 321-338.

Menczer, W. B. (2007). Guaranteed Ride Home Programs: A Study of Program Characteristics, Utilization, and Cost. *Journal of Public Transportation*, vol. 10, no. 4, pp. 131-149.

Mokhtarian, P. L. (1991). Defining Telecommuting. *Transportation Research Record*, vol. 1305, pp. 273-281.

Mokhtarian, P. L. (1998). A synthetic approach to estimating the impacts of telecommuting on travel. *Urban Studies*, vol. 35, no. 2, pp. 215-241.

Muthén, L. K. and Muthén, B. O. (2006). *Mplus User's Guide.* Fourth Edition, Los Angeles.

Naess, P. and Sandberg, S. L. (1996). Workplace location, modal split and energy use for commuting trips. *Urban Studies*, vol. 33, no. 3, pp. 557-580.

Nisenbaum, R., Ismail, K., Wessely, S., Unwin, C., Hull, L., and Reeves, W. C. (2004). Dichotomous factor analysis of symptoms reported by UK and US veterans of the 1991 Gulf War. *Population Health Metrics*, vol. 2, no. 8.

O'Fallon, C., Sullivan, C., and Hensher, D. A. (2004). Constraints affecting mode choices by morning car commuters. *Transport Policy*, vol. 11, no. 1, pp. 17-29.

Parkin, J., Ryley, T., and Jones, T. (2007). Barriers to cycling: an exploration of quantitative analyses. in *Cycling and Society*, P. Rosen, D. Horton, and P. Cox, eds., Ashgate, Aldershot.

Potter, S., Enoch, M., Rye, T., Black, C., and Ubbels, B. (2006). Tax treatment of employer commuting support: An international review. *Transport Reviews*, vol. 26, no. 2, pp. 221-237.

Potter, S., Rye, T., and Smith, M. (1999). Tax and green transport plans: a survey of UK experience. *Transport Policy*, vol. 6, no. 4, pp. 197-205.

Rietveld, P. and Daniel, V. (2004). Determinants of bicycle use: do municipal policies matter? *Transportation Research Part A*, vol. 38, pp. 531-550.

Rietveld, P., Zwart, B., van Wee, B., and van den Hoorn, T. (1999). On the relationship between travel time and travel distance of commuters - Reported versus network travel data in the Netherlands. *Annals of Regional Science*, vol. 33, no. 3, pp. 269-287.

Roby, H. (2010). Workplace travel plans: past, present and future. *Journal of Transport Geography*, vol. 18, no. 1, pp. 23-30.

Rodriguez, D. A. and Joo, J. (2004). The relationship between non-motorized mode choice and the local physical environment. *Transportation Research D*, vol. 9, no. 2, pp. 151-173.

Rose, G. and Marfurt, H. (2007). Travel behaviour change impacts of a major ride to work day event. *Transportation Research Part A: Policy and Practice*, vol. 41, no. 4, pp. 351-364.

Rye, T. (1999a). Employer attitudes to employer transport plans: a comparison of UK and Dutch experience. *Transport Policy*, vol. 6, no. 3, pp. 183-196.

Rye, T. (1999b). Employer transport plans - a case for regulation?. *Transport Reviews*, vol. 19, no. 1, pp. 13-31.

Rye, T. (2002). Travel plans: do they work?. *Transport Policy*, vol. 9, no. 4, pp. 287-298.

Shoup, D. C. (1997). Evaluating the effects of cashing out employer-paid parking: Eight case studies. *Transport Policy*, vol. 4, no. 4, pp. 201-216.

Stevens, J. (2002). *Applied multivariate statistics for the social sciences. Fourth Edition*, Lawrence Erlbaum Associates, Mahwah, New Jersey and London.

Sundo, M. B. and Fujii, S. (2005). The effects of a compressed working week on commuters' daily activity patterns. *Transportation Research Part A-Policy and Practice*, vol. 39, no. 10, pp. 835-848.

Tayyaran, M. R. and Khan, A. M. (2003). The effects of telecommuting and intelligent transportation systems on urban development. *Journal of Urban Technology*, vol. 10, no. 2, pp. 87-100.

Tsao, H.-S. and Lin, D.-J. (1999) *Spatial and Temporal Factors in Estimating the Potential of Ride-sharing for Demand Reduction.* California PATH Research Report, UCB-ITS-PRR-99-2.

Van Acker, V., Witlox, F., and van Wee, B. (2007). The effects of the land use system on travel behaviour: a structural equation modeling approach. *Transportation Planning and Technology*, vol. 30, no. 4, pp. 331-353.

Van Acker, V., and Witlox, F. (2010). Car ownership as a mediating variable in car travel behaviour research using a structural equation modelling approach to identify its dual relationship. *Journal of Transport Geography*, vol. 18, no. 1, pp. 65-74.

Van Wee, B. and van Der Hoorn, T. (1996). Employment location as an instrument of transport policy in the Netherlands : Fundamentals, instruments and effectiveness. *Transport Policy*, vol. 3, no. 3, pp. 81-89.

Vandenbulcke, G., Steenberghen, T., and Thomas, I. (2009). Mapping accessibility in Belgium: a tool for land-use and transport planning?. *Journal of Transport Geography*, vol. 17, no. 1, pp. 39-53.

Verhetsel, A., and Vanelslander, T. (2010). What location policy can bring to sustainable commuting: an empirical study in Brussels and Flanders, Belgium. *Journal of Transport Geography*, (accepted for publication).

Verhetsel, A., Thomas, I., and Beelen, M. (2010). Commuting in Belgian metropolitan areas: The power of the Alonso-Muth model. *Journal of Transport and Land Use*, vol. 2, no. 3, pp. 109-131.

Vogel, D. (1997). Trading up and governing across: transnational governance and environmental protection. *Journal of European Public Policy*, vol. 4, pp. 556-571.

ANNEX 1: Table A: Factor loadings (Varimax rotated) of an EFA with 10 factors (values higher than 0.3 in bold; software: Mplus version 4.1; Muthén and Muthén, 2006)

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	description	%
0.04	0.03	-0.04	0.04	**0.49**	0.19	-0.11	0.05	**0.87**	0.07	<50 employees	22.3
0.03	0.03	-0.07	-0.03	**-0.48**	-0.06	0.20	0.00	0.08	-0.06	199+ employees	21.4
-0.07	-0.06	0.09	0.02	-0.29	-0.15	-0.07	-0.04	0.07	0.00	100-199 employees	29.0
0.03	0.01	-0.01	-0.02	**0.43**	0.06	-0.02	0.00	**-1.04**	0.00	50-99 employees	27.4
0.24	-0.07	-0.13	-0.09	**-0.37**	0.07	**-0.37**	0.08	-0.02	0.13	fixed work schedules	63.1
0.03	-0.03	0.10	0.01	-0.19	-0.11	**0.42**	-0.05	0.01	-0.18	flexible work schedules	40.4
0.04	0.04	-0.15	0.03	**-0.67**	-0.08	-0.22	0.05	-0.06	-0.02	shifts	24.5
-0.05	-0.02	0.10	0.14	**0.40**	-0.06	-0.27	-0.01	0.00	0.04	irregular work schedules	30.3
-0.08	0.08	**-0.31**	0.04	**-0.99**	0.06	-0.21	-0.03	-0.09	0.05	manufacturing (D)	14.6
-0.85	0.12	-0.08	0.05	**0.59**	0.05	-0.20	-0.08	-0.02	0.07	retail & related sectors (G)	11.7
-0.12	0.07	-0.10	**-0.34**	-0.01	0.06	**1.01**	0.28	0.07	0.07	finance (J)	2.4
0.76	-0.17	**0.44**	0.08	0.29	-0.20	-0.13	-0.14	0.01	-0.12	public sector (Z)	46.2
0.29	-0.06	0.02	-0.08	0.10	0.04	**0.58**	-0.14	-0.05	-0.03	central city	37.9
-0.37	-0.07	0.05	0.06	0.08	-0.02	0.03	0.13	-0.01	0.02	agglomeration	19.2
-0.03	0.09	-0.10	-0.02	-0.02	-0.01	-0.28	-0.07	0.09	-0.02	urban Fringe	9.0
0.07	0.07	0.03	0.08	-0.12	0.00	**-0.41**	0.05	-0.03	0.00	outer SMLA areas	13.6
-0.09	-0.01	**0.32**	-0.13	0.28	-0.23	0.04	-0.25	0.03	-0.06	additional cycling fee	42.8
-0.04	-0.06	-0.09	-0.25	-0.19	**-0.43**	0.07	0.02	-0.02	-0.10	secured bicycle storage	28.7
0.07	-0.13	0.19	0.06	0.10	**-0.43**	-0.09	0.07	-0.03	0.01	additional allowance work trips bike	7.2
0.21	0.09	0.13	**-0.34**	0.24	**-0.42**	-0.07	0.05	0.09	-0.12	bicycles available home-to-work travel	0.8
-0.09	-0.06	-0.08	-0.26	0.07	**-0.36**	-0.04	**0.48**	0.12	0.00	bicycles available at railway station	0.6
0.43	0.03	0.15	-0.23	0.12	**-0.59**	-0.04	0.13	-0.02	-0.24	bicycles available for work trips	9.2
0.46	-0.05	0.00	-0.21	0.13	**-0.38**	0.03	0.15	-0.04	-0.03	rain clothes	1.6
0.07	-0.04	-0.05	**-0.41**	0.01	**-0.40**	-0.12	-0.02	-0.10	-0.25	improvement of infrastructure	2.9
0.02	0.10	-0.04	-0.25	-0.13	**-0.78**	-0.01	0.11	-0.04	-0.14	covered bicycle storage	34.9
-0.13	0.08	-0.21	-0.22	-0.14	**-0.79**	0.11	-0.05	-0.04	-0.05	changing room	23.4
-0.06	0.10	-0.23	-0.19	-0.19	**-0.85**	0.15	-0.08	-0.02	-0.02	showers	24.1
0.17	0.01	-0.18	-0.24	-0.01	**-0.55**	-0.04	-0.01	0.03	-0.09	bicycle repair facilities	3.1
0.39	0.06	0.04	**-0.40**	0.11	**-0.46**	0.00	-0.14	0.04	**-0.30**	bicycle maintenance	1.3
0.14	0.04	0.16	**-0.59**	0.10	**-0.36**	-0.17	-0.11	0.04	**-0.31**	information on cycling routes	2.9
-0.15	-0.08	-0.24	**-0.67**	-0.05	-0.11	0.08	0.28	0.01	-0.08	organisation of a carpool	5.2
0.26	0.02	-0.15	**-0.83**	0.04	0.02	**0.33**	0.13	0.03	0.01	linking to a central carpool database	4.6
-0.23	-0.12	-0.08	**-0.55**	-0.24	**-0.33**	0.20	0.20	-0.01	0.00	preferential parking for carpool	1.9
-0.14	0.10	-0.28	**-0.47**	-0.10	-0.25	-0.08	**0.35**	-0.01	-0.21	guaranteed ride home	1.6
-0.03	-0.06	-0.14	**-0.77**	-0.05	-0.19	0.08	0.06	-0.02	-0.21	distribution of information carpool	4.2
-0.14	0.05	**-0.37**	-0.21	-0.16	-0.11	-0.08	0.10	0.01	-0.17	transport organised by employer	4.6
0.03	-0.12	**0.36**	**-0.39**	0.27	-0.05	0.19	-0.23	-0.02	-0.08	supplementary allowance public trans.	23.8
0.25	-0.08	-0.05	**-0.76**	0.04	-0.12	0.09	0.03	-0.03	-0.13	regular consultation publ. trans. company	5.1
0.16	-0.05	0.08	**-0.78**	0.04	-0.23	0.00	0.03	-0.01	-0.05	information on public transport	9.8
0.23	-0.14	**0.33**	**-0.44**	0.09	**-0.35**	0.06	0.13	0.00	-0.26	encouraging public trans. work trips	6.8
-0.17	-0.16	-0.16	**-0.71**	-0.10	-0.16	0.09	-0.04	0.00	-0.07	collaboration with Enterprises.	2.3
0.08	-0.09	0.09	**-0.77**	0.02	-0.08	0.09	-0.16	0.03	**-0.32**	information on SOV-alternatives	6.4
0.07	-0.06	0.01	**-0.76**	-0.05	-0.10	0.01	**-0.42**	0.00	**-0.30**	collaboration with mobility institutions	6.0
0.03	-0.14	-0.03	**-0.55**	-0.07	-0.16	-0.15	**-0.39**	0.03	-0.29	regular consultation with local authorities	8.2
-0.19	-0.09	0.05	-0.24	-0.17	-0.04	**0.40**	-0.06	0.01	-0.19	telework	6.0
-0.03	-0.06	0.04	**-0.81**	-0.03	-0.09	0.22	0.13	-0.03	-0.21	mobility coordinator	3.6
-0.10	-0.25	0.27	**-0.62**	-0.09	-0.16	0.12	0.22	0.03	0.21	parking charge	0.7
-0.21	-0.09	**0.48**	**-0.31**	-0.12	-0.26	-0.04	0.28	-0.03	-0.20	relocation of the site	0.5
-0.30	-0.12	0.04	**-0.39**	-0.02	**-0.36**	0.10	-0.11	0.02	0.20	relocation fee	0.6
0.15	-0.02	0.25	**-0.52**	0.08	-0.12	-0.23	-0.09	-0.08	-0.29	regional or local financial measures	1.4

Table A (continued): Factor loadings (Varimax rotated) of an EFA with 10 factors (values higher than 0.3 in bold; software: Mplus version 4.1; Muthén and Muthén, 2006)

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	description	%
-0.06	**-0.69**	-0.19	0.03	0.05	-0.07	0.04	-0.11	-0.01	-0.16	dangerous traffic (car)	14.4
0.16	**-0.58**	0.19	0.03	0.08	0.02	-0.04	0.20	0.06	-0.05	insufficient number of parking places	25.6
-0.12	**-0.52**	0.06	-0.14	-0.12	0.01	0.06	0.15	0.04	-0.15	high parking costs for employer	4.6
-0.17	**-0.63**	0.01	-0.07	-0.06	-0.05	0.17	0.00	-0.02	-0.14	congestion	26.1
-0.12	**-0.66**	-0.13	-0.12	-0.07	-0.08	0.12	-0.10	0.00	-0.18	dangerous traffic (bicycle)	37.3
-0.06	**-0.76**	-0.02	-0.08	0.03	-0.01	0.06	0.10	-0.05	0.00	unsafety (social)	6.0
0.02	**-0.72**	-0.27	-0.17	0.03	0.12	0.00	-0.04	-0.01	0.02	company image (bicycle)	1.5
0.08	**-0.61**	0.09	0.13	0.17	**0.31**	-0.07	0.01	0.01	-0.06	no possibilities for secured bicycle storage	10.4
0.15	**-0.53**	0.18	-0.05	0.18	**0.32**	0.00	0.15	-0.01	-0.09	no showers	18.8
0.05	-0.30	**-0.68**	0.03	-0.09	-0.06	-0.03	-0.03	0.00	-0.06	no or insufficient public transport service	25.7
-0.01	**-0.37**	**-0.53**	0.04	-0.06	-0.13	-0.15	-0.07	0.02	-0.03	public trans. service not adapted work hours	27.9
0.08	**-0.56**	**-0.36**	-0.10	-0.06	-0.02	0.04	-0.10	-0.01	-0.10	public transport travel time	19.8
0.15	**-0.75**	-0.15	-0.06	0.00	0.08	0.11	-0.22	-0.03	-0.08	low quality, safety and comfort	7.8
-0.09	**-0.32**	**-0.56**	0.05	-0.08	-0.11	-0.06	0.02	0.02	-0.07	distance to public transport stop	15.2
0.00	**-0.79**	-0.06	-0.02	-0.02	-0.02	0.02	0.08	-0.02	-0.01	feeling unsafe in the neighbourhood	5.8
-0.04	-0.12	**-0.45**	-0.09	-0.09	-0.08	0.02	0.08	-0.01	-0.12	recruiting problems due to bad accessibility	3.7
-0.22	-0.14	-0.13	-0.01	-0.19	-0.03	0.04	**0.38**	-0.11	**-0.47**	cost for company cars	4.0
-0.09	-0.05	**-0.41**	-0.23	-0.12	-0.12	0.00	0.26	-0.02	**-0.48**	cost of transport organised by the employer	3.5
0.17	-0.13	-0.15	-0.28	0.03	-0.07	0.04	-0.03	0.03	**-0.51**	obligation to make a transport plan	2.6
-0.01	**-0.46**	-0.25	-0.09	0.00	-0.11	-0.01	-0.15	-0.01	**-0.41**	unsafe routes	7.6
0.05	-0.46	-0.11	-0.10	-0.03	-0.15	-0.05	0.01	0.01	-0.12	feeling insecure due to work hours	5.8
0.06	-0.28	0.08	-0.26	-0.02	-0.04	0.12	-0.21	0.00	**-0.77**	protection of the environment	9.8
0.09	-0.24	0.00	-0.27	0.02	-0.13	0.05	-0.09	-0.05	**-0.73**	health of employees	6.5
-0.05	-0.19	-0.03	-0.29	-0.05	-0.14	0.02	0.09	-0.04	**-0.64**	positive collaboration employer-employees	8.1
0.12	-0.25	-0.11	-0.15	0.07	-0.06	0.10	0.09	0.06	**-0.60**	equality among users of different modes	6.0