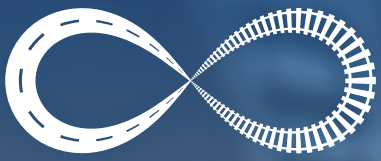

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5th International Conference on Road and Rail Infrastructure
17–19 May 2018, Zadar, Croatia

Road and Rail Infrastructure V

Stjepan Lakušić – EDITOR

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MOBILETIMES – CONCEPTS FOR THE MULTIFUNCTIONAL USE OF TRAVEL TIME

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Abstract

While mobility consumer groups are increasingly inhomogeneous due to individual life styles and preferences, the spectre of transport service offers is also becoming progressively diverse. Emerging information and communication technologies enable people to make use of their travel time for additional activities such as work and leisure by using mobile phones, laptops and tablets. Multitasking has rapidly becoming a widespread social phenomenon.
The paper presents the preliminary outcomes of MobileTIMES, a research project which analyses the multidimensional use of commuter travel time. Based on the analysis of time use studies, an empirical survey in two Austria model regions was carried out for developing concepts for multitasking design solutions with the goal of popularizing transport behaviour transition to public transport. The survey was carried out in two Austrian regions with different infrastructural and social characteristics: a growing rural area in Austria and a growing suburban region in the south of Vienna. Information on general conditions, requirements and suitability of current transport and mobility services from user perspective were gathered. The diffusion of electronic devices plays an important role as it has not only changed travel time activities but – as a result – also individual travel time perception. The consequences on the transport system level will be described. Multitasking designs and multi-functionality offers in public transport to increase user acceptance for longer travelling time are presented. The potential for multifunctional activities in the vehicle interior as well as in bus or train stops on commuter trips is exemplarily presented in the paper.

Keywords: travel time, time use, commuter, public transport, multitasking

1 Introduction

Considering time as a very valuable asset, the project "MobileTIMES" analyses the multidimensional use of commuter travel time with the objective of enhancing the attractiveness of public transport through increased comfort aspects and meaningful time use while commuting. Based on the analysis of time use studies, a comprehensive empirical survey in two Austrian model regions was carried out for developing concepts for multitasking design solutions.

2 Relevance of travel time

2.1 Concept of constant travel time budget

A constant travel time budget is widely accepted in transport sciences. The constancy of travel time was already demonstrated in investigations in Copenhagen since 1914 [1] and later confirmed by numerous empirical studies. Schafer et al. came to the conclusion that, regardless of cultural or regional circumstances, an average of 1.1 hours per day is used for mobility [2]. This constant "mobility time budget" coupled with a clear idea of monetary spending on mobility – depending on the individual's income – allows clear indications of developments or effects on the interdependencies between urban space, spatial distribution and transport network. An analysis of the travel time distribution of different transport system users shows, that all individual users – whether pedestrians, cyclists, motorcyclists or car drivers – not only have similar total travel times, they also have similar travel time distribution. Although car drivers are six times faster than pedestrians, they do not spend less time in the system. Active mobility and private motorized traffic have an approximately equal distribution of travel times, while users (in average) travel longer in public transport. This is influenced above all by the access and exit ways as well as transfer and waiting times. The acceptance of comparatively longer travel times in public transport can be explained by the individual use (in particular) of travel time. Scientific work attributes the constancy of the travel time budget to an underlying human energy budget. This approach also explains the willingness to accept higher travel times in public transport under certain conditions. Public transport users are distracted while driving and busy with other things. The burden of travel time is thereby reduced. The users of public transport therefore stay longer in the system because they use specifically less body energy (for traffic) per unit of time than the other road users [3]. Therefore in larger city agglomerations travel times can increase, but so does the proportion of public transport. This is also valid for countries with an increasing share of public transport trips [4].

2.2 Value of travel time

Studies have attempted to characterize the value of travel time, which in fact is not always viewed as wasted time that, optimally, should be reduced. Travel time can be perceived as time during which the individual is able to engage in activities. Especially travel time in public transport can be seen as time that has been saved or pleasant time where the vehicle becomes a living space and during which a variety of activities can be done, thus making it worthwhile – even productive [5]. The increased use of mobile communication technologies seems to have changed the perception of travel time and its utility [6]. In literature, travel time is sometimes considered to be the worst time of the day and has been reported as being negatively correlated with happiness [5]. But the perception of travel time is also determined by other factors. Travel time as time to be used constructively or for recreation purposes is perceived differently. A study of the Austrian Association for Transportation states that 50 % of the car commuters would be willing to abandon car use for their daily trip to work [7]. A longer travel time would be accepted under the condition of increased comfort or an effective use of travel time in public transport. Furthermore, 71 % of commuters using public transport state that their travel time is used effectively and thus conceived as a benefit [8].

3 Travel time perception and travel time use

Within the project MobileTIMES studies on travel time use were analyzed as a first step for getting an overview on how commuters are using their daily travel time, carrying out multitasking activities. The term multitasking is understood as carrying out at least one side activity simultaneously to another (main) activity, for example reading the newspaper while riding

the train to work. Most national and international studies on time use are discussing multitasking in time use marginally at best. Other time use studies have a strong focus on media use, neglecting other activities off from media use. Furthermore time use is not compared for different means of transport.

3.1 Travel time perception and mobile technologies

The diffusion of virtual media, mobile communication and availability of wireless internet has great effects on the use and perception of travel time and thus shapes travel and waiting time in means of public transport. A time use study of rail passengers in Great Britain (2004 – 2010) states that the availability and use of mobile technologies has increased. 46 % of the respondents indicated that the time seemed to pass quicker by having electronic devices. Listening to music in particular has doubled in its incidence suggesting an increasing capacity for travelers to personalize the public space of the railway carriage [6]. Furthermore relaxing activities can contribute positively to an individual´s emotional response to the commute. Communication with other passengers or listening to music is beneficial to cognitive evaluation and may reduce boredom or stress [9].

3.2 Travel time use studies

In a large British survey about different activities while traveling, reading for leisure (34 %), window gazing/people watching (18 %), and working/studying (13 %) were the frequent activities reported by passengers. Window-gazing was high on short journeys, and the authors suggest there may be a possible travel duration threshold below which there is not a suitable amount of time to do other than window gazing [10]. The duration of travel time also affects the way time is used en route: bigger devices such as laptops are used for longer distances, whereas Smartphones are used both for short and for long distance travels [11]. A train survey in Norway found well over a third of passengers using travel time for work, with nearly a quarter of commuters having their travel time paid as work time [12]. A Swiss time use study (2015/16) focussed on media use and activities during the day [13]. The results show that 57 % are listening to radio or audio files while driving a car, 36 % are using no media. In return, the range of activities in public transport is much broader, reaching from reading newspapers or books (27 %), digital chatting (4 %), surfing in the internet (3 %), listening to audio files (6 %), whereas 53 % of the respondents are using no media while riding public transport. As this study was focussed on media use, other activities such as communication with other passengers or relaxing where not studied. Similar results arise from the last time use study in Austria, which took place in 2008/09 [14]. A detailed analysis of the four most frequently reported trip purposes (commuter trips, shopping trips, trips to social activities and trips for physical activity) was carried out. Less surprisingly, mostly passive activities such as listening to the radio where carried out while driving a car, whereas more active activities such as reading where carried out in public transport. Surprisingly, the share of side activities on car trips for all four analyzed trip purposes is higher than the share of side activities on trips with public transport. On commuting trips by car 34 % of the time was used for side activities (listening to the music 28 %, communication with others 2 %, 4 % not specified), in means of public transport only 28 % of the time was used for side activities (13 % reading, communication with others 4 %, relaxing 2 %, telephone calls 2 %, 2 % listening to music, 5 % not specified). An explanation for the lower share of side activities on trips with public transport is the subordinate role of mobile devices with internet such as Smartphones back in the years 2008/09. In 2017, 94 % of the Austrian population up to the age of 59 use Smartphones (2011: 56 %) [15]. Results suggest that time use is evaluated differently on trips with private car or on public transport. An updated time use study for Austria is planned and will probably lead to different results, as the widespread availability and usage of mobile devices may have a big influence on the use of time.

4 mobilTimes – Survey in Austrian Model Regions

4.1 Project model regions

Based on the findings of literature and studies on travel time use a qualitative social empirical study in two Austrian model regions with different infrastructural and social characteristics was carried out. The "Wiener Umland Süd" is a growing suburban region in the south of Vienna with a high share of commuters. The region "Östliche Obersteiermark", a region in the north-east of Styria, is a shrinking rural area with a low proportion of commuters.

Figure 1 Geographic Location of Austrian model regions

4.2 Empirical commuter survey in model regions

Within the project mobileTIMES a random sample of 400 commuters in the model regions was interviewed by telephone and face-to-face. Alongside demographic information commuters were asked about commuting time and distance, the means of transport, activities during commuting and evaluation of their commuting time.

Table 1 Average commuting distance, time and modal choice of commuters

Average commuting distance	39 km (44 km in rural area, 27 km in suburban area)
Average commuting time	47 minutes
Modal Choice	60 % car, 40 % public transport (32 % train, 8 % bus)

There is a clear connection between commuting distance, travel time and modal choice: with increasing distances and thus travel time the share of public transport users exceeds the share of car commuters. Especially young commuters between 15 – 29 years are using public transport more often for their way to work than other age groups (58 % public transport). No differences in modal choice could be found regarding gender aspects. Almost 100 % of the respondents carry a Smartphone or cell phone with them while commuting. The share of persons carrying a laptop or tablet is increasing with travel time. Quite on the contrary to the results of the Austrian time use study public transport commuters are maintaining significantly more activities on their way to and from work than car commuters (public transport 5 activities, car 1 activity).

Table 2 Main activities of commuters by means of transport

Car commuters	
Driving	Concentrating on driving (81 %)
Activities for private purposes	Entertainment electronically (41 % listening to music)
Communication	Telephone calls (33 % private, 26 % work-related)
Public transport commuters	
Recreation/ relaxation	Daydreaming (52 %); Sleeping (40 %); Eating/drinking (27 %).
Communication	Face-to-face communication (36 % private, 17 % work-related) Written communication Smartphone/Laptop (43 % private, 25 % work-related) Telephone calls (29 % private, 15 % work-related)
Activities for private and work-related purposes	Reading, writing, researching online/electronically (37 % private, 26 % work-related); Reading, writing analog (39 % private, 18 % work-related); Entertainment online/electronically (25 %, e.g. videos, games); Entertainment analog (13 %, e.g. solving crossword puzzles).

For all commuters activities for private purposes are outweighing activities for work-related purposes. One quarter of the respondents are carrying out work-related activities while commuting. Whereas the main activities of train commuters are activities for private or work-related activities, bus commuters use their travel time primarily for recreation and relaxation.

Barriers for carrying out activities

Train commuters indicated more often barriers for carrying out specific activities than bus commuters. One of the main barriers identified is the lack of seats and the interior air quality (in each case 48 % of train users and 31 % of bus users). Another main point is the insufficient technical equipment for using digital devices, such as missing or dysfunctional wireless internet (40 % of train and bus users) and the interior furnishing such as missing or undersized tables, general lack of space, missing handholds or inconvenient seats. Every tenth respondent claims the wish for carrying out further activities, especially train users (15 %, 8 % of bus users) and primarily younger commuters between 15 and 29 years. This indicates changing demands and needs from a generation´s perspective.

Waiting time is used primarily for written/digital communication (42 %), face-to-face communication (31 %), shopping (31 %) and eating/drinking (28 %). The equipment of stations and waiting areas is assessed more critically from train commuters than from bus commuters. The main points of criticism relate to insufficient weather protection (train 38 %, bus 31 %), lacking seats (train 36 %, bus 16 %), missing WLAN (train 29 %, bus 6 %) and lack of toilets (train 28 %, bus 9 %). 25 % of train passengers and 54 % of bus commuters are satisfied with the equipment in stations or waiting areas.

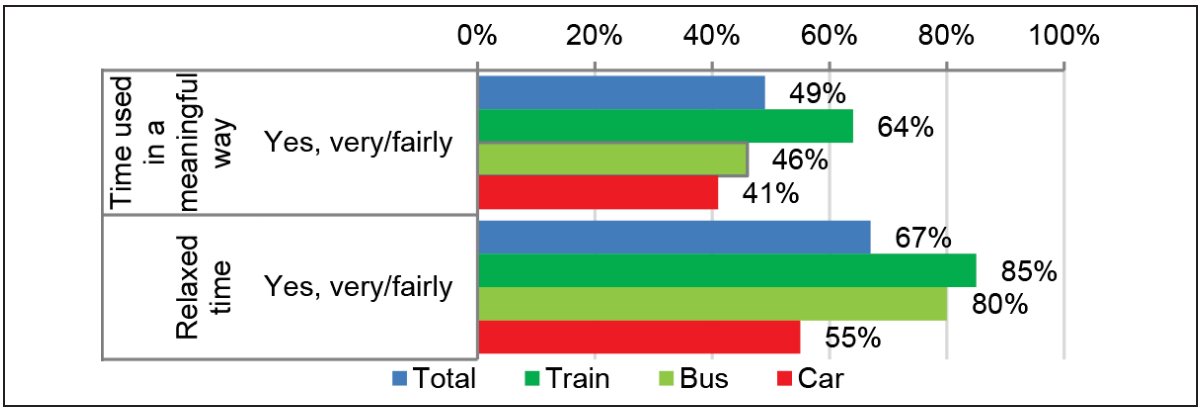

Figure 2 Evaluation of commuting time by means of transport

Evaluation of travel time: 49 % of all respondents value the commuting time as used in a meaningful way, 67 % state it as a relaxed time. Especially train commuters are positively assessing travel time as reasonably used and relaxed time, followed by bus users which evaluate travel time primarily as relaxed time and car users with the lowest level of satisfaction. The commuting time is crucial for assessing the current commuting situation. Whereas 12 % of commuters with a travel time up to 30 minutes are not convenient with their commuting situation the share of commuters travelling more than one hour a day is 35 %.

5 Conclusions and Outlook

Various time use studies show that public transport offers a broad range of activities for commuters which are mainly carried out for private and recreational but also for work-related purposes. Furthermore digitalization and mobile technologies play an important role in commuting time use. In order to increase attractiveness of public transport for commuters, concepts for multitasking design solutions should be taken into account the entire journey (including access and departure, transfer and waiting time). Thus multitasking design solutions must first of all consider spatial characteristics as the offer of public transport services varies between rural and urban areas. These spatial typologies are characterized by different distances for accessing public transport and also different commuting distances and travel times. The results show that commuters with longer travel times have higher expectations regarding travel time use. Multitasking design concepts also have to take into account different target groups. Especially young commuters have high expectations regarding time use in public transport.

Main barriers for time use must be reduced by providing an adequate number of seats through flexible and innovative seating concepts or new concepts such as commuters´ reservation systems. Barriers can also be broken down by providing multifunctional interior equipment (e.g. functional separation between working, relaxing or communication spaces) and appropriate technical features considering the ongoing trend of digitalization (e.g. providing a sufficient number of sockets for plugging mobile devices, optimal cell phone reception, reliable wireless internet, etc.). Regarding the interior furnishing of trains, the new regional train "CityJet" of the Austria Railway Company (ÖBB) tries to combine comfort aspects from long distance trains with the needs of regional short-distance trains for commuters. Adjustable and ergonomic seats, fold-out laptop tables, open and quiet passages, low floor entrances and wireless internet are meeting commuters needs for different usages. The general higher acceptance of trains over busses ("railway bonus" [16]) manifests itself in higher expectations of train users regarding time use in the vehicle. To meet these varying expectations multifunctional design concepts must differ for trains and buses.

Regarding time use, concepts must furthermore consider waiting times in public transport, making them as pleasant as possible through providing standard facilities (e.g. weather protection, adequate seating) and other services in stations such as wireless internet or shops for daily necessities.

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