



Activity–travel behaviour of non-workers from Bangalore City in India



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ABSTRACT

This paper presents exploratory and statistical analyses of the activity–travel behaviour of non-workers in Bangalore city in India. The study summarises the socio-demographic characteristics as well as the activity–travel behaviour of non-workers using a primary activity–travel survey data collected by the authors. Where possible, the research also compares the analysis findings with the case studies on activity–travel behaviour of non-workers, carried out in developed and developing countries. This gives an opportunity to understand the differences/similarities in the activity–travel behaviour of non-workers across diverse socio-cultural settings. The preliminary exploratory analysis shed light on the differences in activity participation, trip chaining, time-of-day preference for trip departure, and mode use behaviour of non-workers in Bangalore city. Statistical models were developed for investigating the effects of individual and household socio-demographics, land use parameters, and travel context attributes on activity participation, trip chaining, time-of-day choice, and mode choice decisions of non-workers. A few important results of the analysis are the influence of viewing television at home on out-of-home activity participation and trip-chaining behaviour, and the impact of in-home maintenance activity duration on time-of-day choice. Further, based on the findings of the initial analyses, an attempt has been made in this study to develop an integrated model that links time allocation, time-of-day choice, and trip chaining behaviour of non-workers. The study also discusses the implications of the research findings for transportation planning and policy for Bangalore city.

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1. Introduction

This study is motivated by the urban transport context of Indian cities, where, on one side capacity oriented policies are dominating to ‘serve’ the needs of private mode users (especially commuters), and, on the other side the quest for introducing people-centric policies for meeting the well-being of citizens (Ministry of Urban Development, 2006). To achieve the policy statements that emphasise on citizen friendly planning, the authors believe that it is imperative to understand the activity–travel behaviour of all (groups of) individuals from Indian cities. While there has been considerable research into the travel behaviour of workers from Indian cities (for example Arasan et al., 1994, 1996, 1998), non-workers’ travel behaviour has not received an in-depth attention. The class of non-working/non-school going individuals (which includes the unemployed and retired individuals and homemakers) holds a significant share of India’s population [compiling information

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from Ministry of Statistics and Programme Implementation (2011) and Central Statistical Office (2011)]. Hence, a thorough knowledge about the travel behaviour of this group would be beneficial for developing citizen-centric urban-transport plans. Recent research also has highlighted the need for comprehending the activity–travel behaviour of non-workers. For example, in a recent mode choice study from Iran, Azari et al. (2013) observed that non-workers were more sensitive to cordon and parking pricing than workers. However, an opposite trend was observed with respect to the influences of travel time. Shiftan and Golani (2005), in their case study from Tel-Aviv, observed that the responses (mode and time change) of workers and non-workers to auto restraint policy measures (parking and congestion pricing) were almost similar. However, another case study from Haifa in Israel shows that workers were willing to change the mode of travel, while non-workers were having higher propensity to change the destination or to cancel trips (Shiftan, 1999). Dharmowijoyo et al. (2014) focused on the activity–travel behaviour of individuals from Jakarta Metropolitan Region in Indonesia. Their analysis indicate that compared to workers and students, non-workers were making lower number of trips, were having lower dependency on personalised modes, were involving in less number of trip chains, and were allocating less time for travelling. Susilo (2005), in their long-term analysis of activity–travel behaviour from the Osaka Metropolitan area of Japan, found that non-workers were expanding their activity and travel engagements over the analysis period compared to workers. Kitamura et al. (2000) observed differences in the daily space–time prisms of workers and non-workers in the Osaka Metropolitan area of Japan. Yagi et al. (2011) explored the household-level interaction between workers and non-workers in the cities (Jakarta and Surabaya) of Indonesia and compared it with the U.S. cases (New York and mid-Ohio regions). The comparison found differences in non-workers' daily pattern between the Indonesian and the U.S. cities. Ye et al. (2008) found significant differences the activity–travel behaviour of non-workers in Xiamen in China and in the Tampa region in the U.S. Levinson and Kanchi (2002), in their analysis on the effects of additional highway capacity on time use behaviour, noticed a significant change in the time allocation to various activities by workers and non-workers during the period from 1990 to 1995. It was observed that after the capacity expansion, non-workers spent a substantial amount of time shopping and travelling, while workers utilised their spare time for staying at home. Kitamura and Susilo (2005) (case study from Japan) and Volosin et al. (2013) (case study from the U.S.) also observed substantial differences in the time use and travel behaviour of workers and non-workers. In a study from New York Metropolitan area, Chen and McKnight (2007) noted the influence of built environment attributes on homemakers' time use behaviour. Area effects were visible on homemakers' time allocation to out-of-home maintenance and discretionary activities. A comprehensive analysis of trip chaining behaviour conducted by Bricka (2008) reveals that non-workers have a higher propensity to chain trips. Using the National Household Travel Survey data of the United States, the author identified that about 70% of the non-workers trip chain on an average weekday, which was much higher than the share of trip-chaining workers (nearly 60%). Socio-demographics and built environment features were observed to exert strong influences on the trip-chaining propensity of non-workers. Misra and Bhat (2000) undertook a comprehensive analysis on the activity–travel behaviour of non-workers in the San Francisco Bay area. Their analysis shows that individual and household socio-demographics have a strong influence on the activity participation behaviour of non-workers. Location attributes did not appear as a significant predictor in their analysis on the activity participation behaviour of this group. Moreover, their study also pointed out the influence of activity participation behaviour on the trip chaining decision of non-workers. Kamruzzaman and Hine (2011) implicitly focused on the effect of household location on the activity–travel behaviour of workers and non-workers (in rural Northern Ireland), and identified that it has a significant role in activity participation and mode choice behaviour of non-workers, which in turn had impacts on the environment. Cirillo and Axhausen (2001) compared the activity–travel behaviour of non-workers from Belgium and Germany. They found similarities as well as differences in activity-participation, stop-organisation, and mode choice behaviour of non-workers in these countries. Espino et al. (2007) found differences in the subjective value of time between workers and non-workers in Gran Canaria, Spain. Cirillo and Toint (2001) undertook a multinational comparison of workers' and non-workers' activity–travel behaviour across Belgium, France, Britain, Germany, and the U.S. They observed similarities as well as differences in the travel behaviour of individuals across the countries. Susilo (2007) analysed the activity–travel behaviour of non-workers using the Dutch National Travel Surveys. It was observed that for a given number of non-work stops and household size, the trip-chaining tendency varied between different regions in the country. Castaigne et al. (2009) focused on weekly travel behaviour of individuals using a Belgian dataset, and found that the average number of trips made by non-workers on Friday and Saturday were higher compared to other days while it was rather similar for workers and students. Aguilera et al. (2009) observed differences in the evolution of travel behaviour (trip rate and trip distance) of workers and non-workers in the Paris region during the period from 1983 to 2001. Alexander (2007) investigated the day-to-day variability in workers' and non-workers' daily pattern and how it was different between the groups using 'Mobidrive' data set from two German cities. The study found significant differences between the daily patterns of workers and non-workers. Susilo and Kitamura (2005) observed day-to-day variability in the action spaces of workers, students, and non-workers in two German cities (Karlsruhe and Halle). Liu et al. (2014) found that weather impact on non-commuters' activity–travel behaviour was much more significant than that on workers in Sweden. Hensher and Rose (2007) observed differences in the value of time between commuters and non-commuters in Sydney under (future) public transport improvements. Banerjee et al. (2007) investigated the travel time budget of commuters and non-commuters from India, Switzerland, and the U.S. They found substantial differences in the travel time budgets between commuters and non-commuters, and across these countries. Using a Swiss data set, Ye (2006) found differences in the association between time-of-day choice and maintenance activity duration between commuters and non-commuters. With a combination RP and SP survey, 'Independent Pricing and Regulatory Tribunal (1996)' identified that, compared to commuters, non-commuters had a higher

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