THE SUSTAINABLE PUBLIC TRANSPORT AND EFFICIENCY IMPROVEMENTS THROUGH BETTER UNDERSTANDING OF FUTURE PASSENGERS

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Abstract- New planning procedures, tools and treatments for mobility issues have recently been fostered and developed; however, technical advances and efficiency improvements are limited. Along with growing traffic volumes, behavioural changes towards more sustainable travel futures are now of crucial importance. The outflow of Public transport (PT) passengers is a problem globally especially with an aging population, and increasing individual motor transport so policy makers and PT providers seek what makes substantial shifts from driving possible. In adulthood, the behavioural change stands mostly on psychological factors like attitudes, habits and convenience regarding potential behavioural change. However, our thinking and attitudes toward transport modes are embedded in childhood thus it is important to understand how different aspects of travel socialization contribute to the explanation of travel mode choice. In this regard, improvements aiming enhancement of user satisfaction should be designed in a way that accommodates all levels of service required by all passengers, notably by cluster of "future passengers" consisting of persons whose personal value system and personal norms are not fully internalized, thus influence on future habitual car use is possible regardless the individual's actual transport mode. Market segmentation describing their heterogeneous motivations and necessities should be developed in order to promote public transport and other alternatives to a car, improve service quality, identify new service opportunities and therefore increase market share of public transport to the detriment of motorized individual transport.

Keywords- Market Segmentation, Public Transport, Sustainable Urban Mobility, Travel Behavior Modification, Travel Socialization.

I. INTRODUCTION

Along with growing traffic volumes, behavioural changes towards more sustainable travel futures have attained crucial importance. Growing wealth globally makes the car a more affordable means of transport as well as conferring elements of status and imagery of success. While some countries are losing public transport modal share, other nations are gearing up for a loss. New planning procedures, tools and treatments for mobility issues have recently been fostered and developed; however, technical advances and efficiency improvements are limited. "In developing a more sustainable transport system, its design and management are important issues. In this process attention should be directed at people's intentions and behavior concerning choice of travel mode as well as to their reactions to changes in the transport system".

Complex view of human mobility requires a consideration of sustainability and the nature of its stakeholders. Public transport (PT) as form of travel that does not harm the environment should seek to be the best quality service, but also make sure on how to use marketing as a tool that can address the outflow of its users. There are many good examples of theoretical researches or transport initiative's practice dealing with the travel behavior modification, but the results do not lead to significantly higher PT usage, which is often due to wrong or excessive general targeting. If we understand that travel behavior is influenced by information gained from own experience or by the experience and behaviour of other travellers, then social theory of travel mode behavior [see 7] is crucial for policy & transport planning as well as it provides insight of consumer behaviour (attitudes of travellers). These topics are further described in this paper along with travel market segmentation and definition of future passengers.

II. SUSTAINABLE TRANSPORT

The concept of mobility was predominantly seen as a matter of transportation services provision up until the end of the 1970s. The main problem was to match infrastructure supply with transportation demand. The way cities are planned started to change in the last decades of the last century resulting in changed assumption that the mobility problems are not only a consequence of a limited physical access to the transportation modes but they involve complex environmental, economic, social and behavioural issues. Černý, Černá stressed that while harmonization of ecological and social requirements is political issue, economic efficiency is often being emphasized as a condition for sustainable development particularly in cases of transport. The new urban mobility concept focuses on the improvement of the mobility and accessibility conditions aiming at a better quality of life for urban

citizens, and hence on the pursuit of what is currently called sustainable urban mobility. This concept was later adapted: "Sustainable Urban Mobility (SUM) is about the ease, convenience, affordability, and accessibility of travelling to one's destination with minimal impact on the environment and others. Travel should be safe, at optimal speeds, and by the most direct routes. Options, with real-time information should be readily available for travellers to choose based on time, costs, distance, and other factors" . Finally sustainable urban mobility planning should "meet the current transport needs without jeopardizing the ability of future generations to meet these needs". Nowadays daily mobility of people is often divided into non-sustainable form of travelling (motorized individual transport) or its sustainable alternatives like human-powered forms of travel ("active transport") and public transport. Active transport supports public health objectives, reduces pollution and traffic congestions and particularly helps to children' physical and social development. Moreover, suitable public transport system and active transport can generate sustainable mobility cluster that substitutes for automobile travel when governmental support is given. There is evidence that the cluster does not interfere but together makes substantial shifts from driving possible. The successful transition of sustainable mobility in local transport plans can be achieved by its stakeholders when:

• "Long-term plan management and governance to ensure delivery of the desired outcomes is adopted.
• Transport demand is managed in relation to supply, with projects focusing on traffic restraint and the greater use of 'smarter travel choices'.
• Economic efficiency is achieved through increasing emphasis on maximizing use of existing assets and changes of urban mobility policies that are underpinned by what works philosophy. It is important to assess robustly all the potential investments against value for money, deliverability and affordability criteria, as well as the contribution they make to strategic priorities.
• Importance is given to introduction of approach to anticipating and managing risks.
• Policy effectiveness is clearly demonstrated to stakeholders to ensure they understand impacts and outcomes of successful SUM implementations.
• Traditional engineering approaches are being replaced by a greater emphasis on behavioural change skills".

III. THE MOST PROMISING TARGET GROUP TO INCREASE THE PUBLIC TRANSPORT MODAL SHARE

A. Efficiency Improvement

Treatment of mobility issues, especially public transport passengers' outflow (modal shift from PT to car), should not only be built on investments in infrastructure or transport networks completion but requires PT systems to become more market oriented and competitive. Beirão and Cabral state "it can only be achieved by a clear understanding of travel behaviour and consumer needs and expectations. Therefore, it becomes essential to measure the level of service in order to identify the potential strengths and weaknesses of public systems. This can provide clues to public transport management in the process of evaluating alternative service improvements aimed at enhancing user satisfaction and increasing market share." To offer personalized and relevant services, innovation and its ideation should be user-oriented. Its key part is capturing and understanding user context that helps to identify new service opportunities. Service design thinking should be applied in order to provide better "service experience" which is "a unique experience to an individual at a specific point in time, in a specific location, in the context of a specific event and recently has been viewed as both an individual and social experience. Service experiences often occur as a series of events that influence customer satisfaction and generally have an influence on consumer pre-purchase decisions, on-site evaluations, and post-purchase behaviour". Last but not least, encouragement of sustainable mobility can be also achieved by application of social marketing approach that "requires the recognition of different target groups that describe the heterogeneous motivations and necessities of all consumers. Knowledge about the motivational basis of target groups can be used to design interventions to promote sustainable behaviour more efficiently". For its application is crucial 'what works' philosophy based on previous experiences of similar campaigns.

B. Travel Behaviour Modification

Public transport sector and its services are being perceived very specifically when compared with traditional business models and not all improvements can achieve desired goals. The paper of Beirão and Sarsfield Cabral has deepen the understanding of travelers' attitudes towards transport and explored perceptions of public transport service quality. Car users have lower perceptions of public transport than public transport users, which means that public transport is actually better than they think. Their perception is often lower due to the lack of personal experience in past years when improvements happened. To investigate the effect of personal experience of public transport, Abou-Zeid, Witter conducted experiment in Switzerland that studied the effects of a temporary change in the mode of travel to work on travel happiness and mode switching. Despite the fact that after intervention participants' perceived overall quality of public transport has improved and prior service misperceptions have been corrected, unfortunately none of the 30 participants switched completely to public transportation.

Another paper of Abou-Zeid and Ben-Akiva compared the findings from a similar experiment conducted at the Massachusetts Institute of Technology (MIT) with Swiss experiment and delivered significant outcomes. Around 30% of MIT experiment participants gave up the car as their primary mode of commuting immediately post-treatment.

Authors identified their stronger predisposition to switch due to the following pre-treatment psychological factors:

• Stronger public transportation use intentions and weaker car use intentions (which nonetheless may be affected by social norm bias because they are reported intentions).
• Lower satisfaction with the car commute and less favourable perceptions of certain car attributes such as flexibility and travel time.
• More favourable perceptions of certain PT attributes such as the ability to get things done while traveling and the flexibility of PT.
• Greater commute cost consciousness.

Measures aimed at behavioural change towards a more sustainable way of living, face complex constraints and resistance. In contrast of widely accepted behavioural changes at home (recycling or energy saving), measures related to individual daily mobility and tourist travel encounter much lower levels of acceptance and implementation due to the influence of psychological factors like attitudes, alternative levels of habitualization and convenience regarding potential behavioural changes. In this regard, Hancock and Nuttman emphasized approaches to behavioural change that can be driven by both stakeholder theory and by a mixed method ecological social model which adds conceptually to the community-based social marketing and behaviour change approach of practitioners. An ecological approach treats behavioural systems as complex ecologies with multiple influences working in competing directions to influence behaviour. Promotion of travel alternatives to car users should be considered as another option of mobility issues treatments. According to the theory of planned behaviour, "the individual's attitude will change in favour of the alternative if a person is educated about the health/other benefits of using alternative(s) to a car". However, other studies suggest that "much of people's daily travel mode choices are habitual and not always preceded by the deliberation of alternatives". Beirão and Sarsfield Cabral suggest that "one strategy to attract users could be (both) improving public transport image, and providing more information about the transport system to the groups with higher switching potential." Research of Thøgersen focused on promotion of public transport as a subscription service. The only intervention that had an effect was the free month travel card distributed to car owners in Copenhagen, Denmark. It led to a significant increase in commuting by public transport, however, the effect became weaker when the promotion offer had expired, but an effect was still evident five months later. It was mediated through a change in behavioural intentions rather than a change in perceived constraints. Results of several studies on free public transport tickets provision were summed up by Tillema, Ben-Elia as mostly inconclusive as behaviour returned more or less to what had been before the incentives were given.

C. A Social Theory of Travel Behaviour

"The understanding of how travel behaviour develops and changes over time is important in order to identify possibilities for influencing behaviour. A traveller's decision to change behaviour may be influenced by new information gained from his/her own experience, or may be influenced by the experience and behaviour of other travellers, hence social interaction between individuals may have an influential role in travel behaviour". Baslington stressed that "our thinking and attitudes toward transport modes are embedded in childhood and so car dependency should be tackled from a social policy rather than just a travel demand management." The online survey of Haustein, Klöckner evaluated how different aspects of travel socialization (mediators like family, school, media and peers; importance ascribed to driving and acquisition of driving license) contribute to the explanation of travel mode choice of car in young adulthood: "Car habit is mainly influenced by the symbolic-affective importance ascribed to driving and acquisition of a driver's license as a young adult.

While the communication with peers has a negative influence on car use habit, the communication with parents has no significant effect. But parents turns out to be the strongest predictor of social norm. Personal norm is mainly affected by multi mobility communication with peers and by social norm. Considerably weaker car use habit is proven to be when personal norm is to use public transportation."

According to Klöckner and Matthies, habits do include socialization influences and these influences are mediated through the intermediate steps. Firstly socialization aspects are internalized into one's personal value system and personal norms and as second step this is leading to behavior. In the end, behavior is translated into habits if they are successfully performed consistently enough. The study of Baslington on children travelling to school presents evidence to current travel behaviour of children (age 7-11) and their parents in the UK. He states that "social processes can be as important as the cognitive in understanding parental car user behaviour." The latest contribution to the topic has been delivered by Mackett. He stressed that children's travel behaviour varies from that of adults

in having less choices about where they go and also in parental concern of letting children travel unescorted by an older person, both due to the changing influential factors of children's travel behaviour in recent years caused by rapid development of car-oriented lifestyles and increased numbers of mothers in employment. Generally a little literature has been published on Travel Socialization yet the phenomena became one of approaches to influence the future usage of public transportation.

A limitation of Haustein's study consists in measuring socialization retrospectively in student sample, which makes information about the socialization aspects less reliable. It is possible that the participants reconstructed their travel mode socialization based on their actual norms, habits and behavior so aspects of socialization that have been neglected in former studies on adults' mobility behavior should be incorporated. It is suggested that positive experiences with public transportation could be fostered in childhood by using public transport for school trips and by reduction of general need to be driven.

D. Market Segmentation

The segmentation into meaningful groups is necessary for hard and 'soft' transport policies design. In regard of theoretical background of travel behavior modification, market of children as "future passengers" should be segmented with acknowledgment of social theory of travel socialization for successful policy interventions or social marketing design, however, the studies on market segmentation have not been deliberate specifically to this target group yet.

The qualitative study of Jensen has created six mobility types: The passionate car drivers, the daily life car drivers, the leisure time car drivers, the cyclists/public transport users of heart, the cyclists/public transport users of convenience and the cyclists/public transport users of necessity.

Anable has extracted six distinct psychographic groups with varying degrees of mode switching potential by cluster analysis: Malcontented Motorists, Complacent Car Addicts, Die Hard Drivers, Aspiring Environmentalists, Car-less Crusaders, Reluctant Riders. Variables used to derive them were attitudes towards car use, alternatives to the car, the environment and 'Green' behaviour. Cluster of "Die Hard Drivers" had the lowest switching potential. They are fond of cars and car travel, believe in the right to drive cheaply and freely, have negative feelings towards all other travel modes and have strong behavioural and social norms (belief in 'trend setting' and poor image of bus users). Lastly Beirão and Cabral conducted the segmentation using attitudes toward transportation (car dependence, need for control, status seeking, desire to change the form of transportation, pro public transport, desire to help the environment, insensitivity to cost, sensitivity to travel stress) resulting into six distinctive groups of travellers in Porto Region of Portugal. Each market segment has manifest distinctive travel behaviour and various degree of intention to use public transportation.

Cluster of "Obstinate drivers" had the strongest negative feelings toward public transportation ("would hate it if they had to use public transportation") and highest psychological car dependency. They also had higher education and higher income than other contrasting attitudes (clusters). The urgency of targeted strategies development and promotion of alternatives to a car is essential in two particular travellers' segments: Anable's "Die Hard Drivers" and Beirão & Cabral's "Obstinate drivers". It would be worthwhile to target these segments because such individuals have none or low intension of behavioural change besides both clusters had the largest share of those having kids, thus their personal norms and beliefs as parents should be very likely having influence on children's personal value system and personal norms setting. In order to prevent unsustainable mobility behaviour of next generation, "treatment strategies" or social marketing should notably focus on individuals of these two clusters with their descendants included.

CONCLUSIONS AND SUGGESTIONS FOR FUTURE DEVELOPMENTS

Scholars recommend that increase of public transport modal share should be achieved by market orientation with user-centric service design rather than by focus on service provision. The most promising target group for travel behavior modification are children, however, in case of children traveling, the suitable moment aiming travel behavior modification varies by the phase of travel socialization of each individual yet we can assume that cluster of "future passengers" of public transport consists of persons whose personal value system and personal norms are not fully internalized, thus influence on future car habit is possible regardless the individual's actual transport mode. Furthermore, market segmentation covering all children describing their heterogeneous motivations and necessities should be developed in order to promote public transport and other alternatives to a car, improve service quality, identify new service opportunities and therefore increase market share of public transport to the detriment of motorized individual transport.

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