Influencing Sustainable Mobility with Social Influence

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ABSTRACT
This paper explores how a socio-psychological approach strengthened with social influence theory can contribute to attaining sustainable mobility by evaluating four mobility projects in the Netherlands as a response to the lack of that approach in Dutch planning practice. Findings indicate that social influence can contribute effectively to current mobility approaches. Social influence is activated when either social proof is triggered through descriptive social norms or when commitment is triggered through competitions with financial incentives.

Keywords
Sustainable mobility, social influence, transport and land use planning, socio-psychological approach

INTRODUCTION

Understanding mobility

In a world of rapid urbanization and globalization, inhabitants of urban regions suffer from diminishing accessibility, frequent congestions and related externalities such as pollution and economic losses [5]. Mobility of passengers and goods and how they are organized therefore have a direct impact on the liveability of a city beyond economic and environmental dimensions [1].

In recent years, the transport and land use planning domain has reached a paradigm shift by adopting a sustainable mobility perspective that incorporates the social or human dimension in organizing the built environment and its mobility flows [1]. This perspective differs from the traditional approach by advocating for the creation of liveability and accessibility through i) reducing travel demand, ii) triggering mode shift (from predominantly car use for travel to either public transport or slower modes such as cycling or walking) and iii) reduce distances and encourage efficiency by integrating land use planning with transport planning [1]. This differs from the conventional approach through the use of social aspects and behavioural changes. Planners need to focus not only on the transport system itself, but also on human needs.

The biggest obstacles to sustainable mobility are institutional barriers [6]. This refers to the man made boundaries such as legislations and social norms that can influence travel demand and mobility patterns. In light of the human aspect of the sustainable mobility perspective, it becomes important to consider the socio-psychological approach (SPA). The SPA is often neglected in Dutch planning policies and practices [4; 2]. Given that Cialdini [3] has shown that psychological approaches can dominate other approaches through social influence, this paper proposes that transport and land use planning can benefit from social influence in order to achieve sustainable mobility.

Exploring Social Influence and Sustainable Mobility

This paper aims to explore the potential for social influence theory to achieve sustainable mobility practices. The research question is: 'What role could social influence fulfil in order to contribute to the three domains of sustainable mobility?' A theoretical framework is proposed combining SPA with social influence theory to evaluate current and completed mobility projects and practices in the Netherlands. A multi-criteria analysis based on the theoretical framework provides indicators for evaluation. Empirical data on sustainable mobility practices is collected through policy document analysis and interviews. The findings enabled the formulation of possible lessons for planning practice and theory.

The concepts of sustainable mobility, the SPA and social influence leading to the theoretical framework will be elaborated upon next. This is followed by the methodology describing data collection and how to analyse the interaction of the above concepts. The mobility practices are described next and the theoretical and empirical potential for synthesis will be analysed. The paper concludes on how social influence can contribute to thinking and acting towards sustainable mobility. A reflection on the quality of the research is included, along with potential ethical consequences and recommendations for further research.

THEORETICAL FRAMEWORK

An integrative theoretical framework for evaluation based on the concepts of socio-psychological approach and social influence is proposed below.

Sustainable mobility

Considering the human dimension of the sustainable mobility perspective [1], planning efforts for sustainable mobility is understood in this paper as 'an umbrella concept under which social, economic and environmental targets regarding mobility needs of the present can be

realised, without compromising the ability of future generations to meet their own needs.'

Socio-psychological approach (SPA)

Mobility can be understood through three approaches [4]:

- Geographical – Travel is understood through constraints in time and space in relation to time spent at destination and reaching a destination;
- Economic – Travel occurs in relation to the utility of the destination reached and an individual's utility function;
- Socio-psychological – Travel is based on choices, perceptions and psychological factors (i.e. habits).

The socio-psychological approach (SPA) explains travel behaviour through emphasising motivational factors, encompassing attitudes, social norms and the perceived control of behaviour regarding mobility options. The focus of SPA on human dimensions provides the best fit to achieving sustainable mobility goals.

The reason for the neglect of SPA in planning policies and practices has to do with the preference for quantitative analysis and the economic and geographical approach [4]. The SPA on the other hand requires intimate knowledge of highly individualistic and unique characteristics for each traveller. This makes its translation towards implementation in transport planning policy challenging. This is where social influence can provide tangible methods to strengthen SPA.

Social influence

Social influence has its basis in the field of psychology and has been implemented widely in the advertising and organizational change industries [3]. Social influence theory aims to discover and engage fixed-actions pattern, understood as intricate sequences of behaviours and their triggers [3]. These patterns and triggers are translated as six weapons of influences, namely i) reciprocity - to repay in kind what another has provided us, ii) consistency and commitment – sticking to what one says one intends, triggered through competition, iii) social proof – assuming behaviour of others to reflect correct behaviour in oneself, iv) liking – the extent to which we like others, v) authority – blindly following experts and vi) scarcity – scarce material and immaterial goods are more desirable than non-scarce goods.

Social influence is defined in this paper as consciously or unintentionally influencing human behaviour based on one or multiple weapons of influence. For example, bicycles are often parked in proximity of other bicycles: unintentionally, the bicycle parking behaviour of others influences the choice of where to park bicycles.

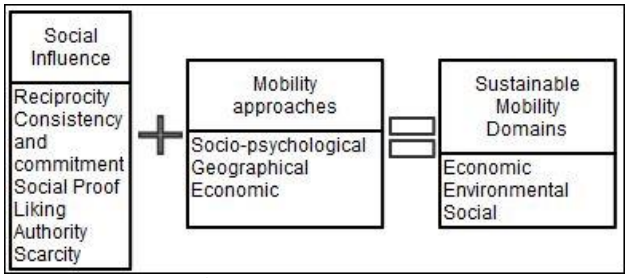

Figure 1: Theoretical framework

Through the six weapons of influence, social influence theory provides tangible instruments for engaging the SPA to mobility. In turn, this combination engages the human dimensions of sustainable mobility towards societal, environmental and economic benefits (see figure 1).

METHODOLOGY AND CASES

A two-step deductive process is employed to explore how social influence and SPA can contribute to sustainable mobility. First, a multi-criteria analysis (MCA) of literature is employed to identify similar characteristics in SPA and social influence theory. Subsequently, four cases with explicit sustainable mobility goals are evaluated in the same fashion for the presence and influence of those characteristics. In some cases, interviews are conducted to supplement the information. The triangulation between the methods (MCA of literature, case studies from policy analysis and interviews) and replicated cases establishes internal and external validity and reliability.

Multi-criteria analysis (MCA)

This analysis is built on an earlier study by De Witte et al. [7] that reviewed 76 scientific articles on the SPA. The same method is applied to literature on social influence to generate two MCA. In total, 11 articles from peer-reviewed, international academic journals were selected based on relevancy to topic. Each article was analysed for the following indicators; i) the specific characteristic mentioned (SPA or social influence), ii) the total number of times mentioned, iii) source objectivity and iv) characteristic's prevalence. Similarities of characteristics between both MCA were analysed[1]. For example, social norms in the SPA is concerned with how people evaluate car use. Whereas in social influence, social norms describe how people are expected to behave. Characteristics unique to the social influence MCA such as goodwill are listed to explore its potential contribution to the SPA.

Case studies

Cases were selected from the project list from Ministry of Infrastructure and Environment [2] on two criteria; i) current and completed cases with explicit sustainable mobility goals, ii) with/without social influence theory applied. The selected cases are;

- Project B-Riders – Current project by Province of Noord-Brabant to promote e-bike use, employs social influence (commitment enhanced through competition, social proof, linking and scarcity) through smart phone application 'coaching' to engage 1850 participants with financial incentive per kilometre cycled to stimulate peak traffic avoidance.
- Rieker Circle Line[2] – Current project by ORAM[3] that does not employ social influence to reduce congestion in the Rieker Business Park by 2.5% with a free bus for

[1] The MCA can be requested at the author.

[2] This translates to 800 travel behaviour changes or spatio-temporal-modal alterations (STMAs).

[3] 'Ondernemersorganisatie Amsterdam' - A network lobby of entrepreneurs situated in Amsterdam

employees at the park that drives twice every 10 minutes during rush hours.
- Van5Naar4 - Completed project by DTV Consultants using serious game to engage other institutions to change their travel behaviour during rush hours, employs social influence (competition with high scores[4], commitment and social proof).
- Spitsmijden Brabant – Completed project by Province of Noord-Brabant to reduce congestion between cities of Den Bosch and Eindhoven with financial incentives to travel outside of rush hours that does not employ social influence[5].

In addition, semi-structured, in-depth interviews were conducted with project supervisors of the B-Riders and Spitsmijden Brabant cases due to unclear participant/supervisor relationships to supplement the cases.

RESULTS

In order to explore the full potential of social influence for sustainable mobility through the SPA, the results of the MCAs reveal the theoretical potential for synthesis and this is tested against the results of the case studies for potential clashes and future contributions.

Theoretical synthesis

Three matching characteristics were found between the SPA and social influence theory:
- Social/descriptive norms – Measures describing what is common to do, favouring car use in SPA,
- Uncertainty and emotions – Social Influence is most effective in uncertain situations and SPA focuses on arousal and stimulus overload in those situations,
- Time – SPA states that attitudes and contexts change over time while Social Influence states that influence mechanism becomes less dominant over other incentives over time.

The following characteristics are unique to social influence theory;
- Group size – The larger the group, the larger the effect of the weapon of influence,
- Similarity – The more people recognise themselves in others, the stronger the weapon of influence,
- Goodwill – The effect of weapons of influence increase in relation to goodwill,
- Contentment – Weapons of influence are more effective when contentment with project increases and;
- Responsibility – Weapons of influence are more effective when the affected feels more responsible for their role in a project.

These unique characteristics are checked with the cases using social influence to assess new insights that social influence could provide for the SPA. Based on the previous theoretical framework and the results of the MCAs above, the role that the SPA combined with social influence can play in achieving sustainable mobility through;

Achieving a social, economic or environmental sustainable mobility target by understanding or influencing travel behaviour through;

- Accommodating the perceived control of behaviour by using weapons of influence in a context susceptible to current and changing social norms over time and paying attention to uncertainty and emotions,
- Encompassing attitudes and social norms through group size and similarities within these strategies,
- Emphasising motivational factors such as goodwill, contentment and responsibilities in strategies for sustainable mobility.

Empirical synthesis

Current projects are compared for the contribution of social influence while completed projects are compared for the nett effect of social influence. The effectiveness of the utilised weapons of influence are compared to the effects of cases using the economic or geographical approach.

Current projects

B-Riders aimed at attracting 1850 participants. 2300 people participated at the moment of research, resulting in a 124,3% occupation degree. The Rieker Circle Line aimed at attracting 800 participants. 1100 people participated at the moment of research, resulting in a 137,5% occupation degree. Given the minute difference in occupation degrees, social influence does not appear to be as effective as the economic and geographical approach. However, B-Riders did attract a higher absolute amount of participants and the project manager stated that participants rarely deviate from their cycle plans in the coaching application: participants are committed to their electric bikes. It is not yet sure whether Rieker Circle Line participants will continue to use the bus when their financial incentive disappears, whereas B-Riders were able to pay and keep their electric bikes from the cycled kilometres.

Completed projects

Van5Naar4 realised 21% of its target or 210 STMAs. Spitsmijden Brabant affected 53% of its participants or 1270 STMAs. The effect of the financial incentive to change behaviour (economic approach) appears to be much stronger than the effects of social influence alone. The crucial difference between the cases is that Spitsmijden Brabant costs money for every STMA made, whereas the STMAs of Van5Naar4 do not. This is relevant as Spitsmijden Brabant is funded by public sources and Van5Naar4 broke even.

The above case comparison raises questions about the effectiveness of social influence and under which conditions it could be effective. Given the result of the comparison, the role that social influence coupled with the SPA on sustainable mobility is seen as:

- Able to contribute with commitment and social proof,
- Not as effective as the economic or geographical approach.

[4] Score is based on the amount of STMAs the 'players' make during morning and evening rush hours. Players compete against their own as well as other institutions. The costs to participate vary from €15 to €30 based on the total number of players.

[5] No reduction target was set: everyone travelling six or more times a week between these cities was invited to participate. This resulted in 2400 participants.

Linking theory and practice

Regarding the matching characteristics of the MCA, both B-Riders and Van5Naar4 utilised descriptive norms (i.e. B-Riders shows how many kilometres all participants have cycled, implying that cycling is good; Van5Naar4 shows average STMAs of all participants, both within the same company and in other companies), but neglected the effects of emotions, uncertainty and time (i.e. information of both projects is only accessible when the participants inquire for it, not when it is very crowded or construction is taking place).

Looking at the unique characteristics of social influence, only goodwill (relation between participants and/or supervisors) and group size were measured in these cases. There was a strong linkage between participants in Van5naar4, but its effects are not measured in the project.

Group size is a characteristic often employed through social proof and gauging social norms, yet its effects cannot be disaggregated from other characteristics, since the projects differ in goodwill, affecting the qualitative relation of a similar group size.

The results indicate that social influence theory could contribute to sustainable mobility as both emphasize the human (group and individual) aspects to mobility in attempting to influence travel behaviour. Social influence does coincide with the SPA and thus could contribute to sustainable mobility. However, the more established geographical and economic approach to sustainable mobility has proven more effective, as the geographical need for travel translated as occupation degrees proved more influential in the Rieker Circle Line and the financial incentives in Spitsmijden Brabant proved more influential than that of social influences in Van5naar4

The results show however that social influence is effective through social proof (and) through establishing social norms, and encouraging commitment through competition. For example, in Van5Naar4 over 200 peak traffic avoidances are achieved every week without structural costs by showing how often other players do so and by establishing the players within a competition. The effectiveness of social influence might be more evident when mobility strategies incorporate elements of insecurity, emotions and time, goodwill and group size.

CONCLUSION

The research question 'what role could social influence fulfil in order to contribute to the three domains of sustainable mobility?' can be answered accordingly;

- Social influence can be integrated with the socio-psychological approach (SPA) to mobility in order to affect sustainable mobility when it adds to either the geographical or economic approach. This is particularly effective when financial incentives are scarce.
- Social influence contributes to the SPA when either social proof is triggered through descriptive social norms or when commitment is triggered through competitions.

However, the utilisation of social influence theory for sustainable mobility governance raises questions about legitimacy and ethical conflicts within a supposed democratic process of planning. This approach has room for manipulation and raises questions as to who should decide what the desired travel behaviour pattern should be.

In reflection, the quality of the research was affected by the lack of ex-post evaluation of the Van5Naar4 project by the project organisation. Only publicly available information was used. It is recommended to employ more ethnographic observations before, during and after these projects to get a clearer understanding of its workings. The case comparison indicators were also selected based on availability and not on theoretical precedence due to a lack of similar research. Further research could therefore provide more rigorous methods to measure social influence in mobility projects. For example, additional criteria such as specific ratios of the socio-psychological approach in each project and the necessary time and/or budget constraints can improve the method and outcomes discussed in this paper.

ROLE OF THE STUDENT

The research question was proposed by the author in reaction to the sustainable mobility topic of the BSc Environmental and Infrastructure Planning thesis supervised by dr. ir. W.G.Z. Tan. The author is responsible for the theoretical framework, research design, data collection, analysis and the writing of the thesis. The results have been shared with the municipality of Groningen as part of the living lab collaboration with the Faculty of Spatial Sciences - Urban Gro Lab. The author is currently a Research Master student of the same faculty.

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