Zoom in the attitude-behaviour gap: low carbon travel behaviour

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Abstract. The concept of pro-environmental behaviour in low carbon consumption has increasingly attracted academics' attention in the last two decades. There has been a growing interest in exploring the association between people's travel attitude and behaviour. This study has critically reviewed, compared, and discussed some of the key theories around these research topics. However, based on the findings of the literature review, there is a dearth of research examining the association between people's travel attitude and their actual behaviour. Therefore, this study seeks to fill the gap by examining the causal linkage between people's attitude towards a specific travel mode and their actual travel behaviour.

1 Introduction

Following the waves of agricultural civilisation, industrialisation and informationisation, the low-carbon economy is another significant civilisation [1, 2]. Low-carbonisation has been promoted as an essential way to deal with climate change [1, 2, 3, 4]. A low carbon economy consists of three elements: macroscopic low carbon decision-making, microcosmic low carbon production and low carbon consumption [2]. According to Baeumler et al., the world will be highly urbanised with 70 percent of the world population residing in urban areas [5]. Hence, consumer behaviour changes to adopt a sustainable lifestyle is urged [5, 6].

It is important to focus on environmentally significant behaviour based on its impacts prior to exploring antecedents or designing a behavioural change intervention in order to maximise its benefits [7, 8, 9, 10, 11]. Therefore, this study emphasises on daily travel behaviour due to its significant environmental impact [12, 13]. It is urged that by 2050, there is a need to reduce transport emissions by at least 50%, because in developed countries it contributed to approximately 30% of anthropogenic CO₂ emissions, and globally, nearly 23% emissions [14, 15]. Accordingly, a transition to pro-environmental travel behaviour is recommended as one of the most effective ways to combat the climate change [16, 13, 15].

The antecedents of travel choices that either encourage or hinder pro-environmental behaviour can be broadly grouped into three categories: demographic factors, internal factors, external factors. Gender is one of the most discussed demographic factors in the literature. Some academics suggest that female have a greater tendency to adopt environmental behaviour than male due to their higher emotional engagement and environmental concerns, as well as having weaker car habits and lesser

attachment to technological solutions [17, 18]. Others argue that different social roles can lead to different patterned behaviours such as married women tend to travel more to places such as supermarkets and schools as they have been assigned to more household responsibilities than men [19]. Moreover, elder, single and low-income people have a greater tendency towards sustainable transport mode because they have less appliances [20]. Accordingly, travel choices can be influenced by the differences between gender, household responsibility and lifestyle.

Despite the socio-demographic factors, theory of planned behaviour (TPB) is widely cited framework in environmental studies [21, 22]. It is suggested that there are three key factors influence behavioural intentions: perceptions of behavioural control and social norms, and attitudes toward the behaviour [21]. However, pro-environmental travel behaviour is complex which cannot simply use the linear attitude-behaviour nexus to explain. Researchers such as Barr et al. have all denied such association as they found that even an environmentalist would not behave pro-environmentally at all times [23, 24].

A high attitude-behaviour association could only be achieved when measuring these two variables on the same level [24]. This is supported in numbers of related studies which have all indicated that a particular pro-environmental behaviour is better predicted by its behavioural related attitudes than general environmental attitudes [24, 22]. This is because that the contextual and behavioural spill-over effects of such general attitudes are very weak [25]. However, research reveals that individuals' socio-demographic and socio-economic characteristics could influence their travel behaviours differently, but have no effect in their attitudes as it's only related to unsustainable travel behaviours [26]. Accordingly, this study is set to examining the existence

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of a causal linkage between the attitude of a particular behaviour and the actual travel behaviour.

Individual's behaviour could also be influenced by external factors such as institutional, social, and cultural factors. Institutional factors such as public infrastructures are key to encourage pro-environmental behaviour [17]. Furthermore, although economic, social, and cultural factors have a great influence in behaviour change, they are interrelated with internal factors. Therefore, the distinction between them is blurred.

2 Materials and Methods

Rajecki [27] opined that attitude-behaviour measurement and temporal discrepancy are two important research limitations in behavioural studies. This reference is relative dated, but the limitations are still remained valid [7, 24, 8]. This is because attitude and behaviour are constantly changing [24, 10]. Therefore, the challenge is to design a valid way to examining attitude-behaviour relationship [17]. Accordingly, this research attempts to address the two methodological limitations by examining the nexus between daily travel attitude and actual travel action, and the effectiveness of integrated interventions.

This research is part of a larger study [28]. Two datasets were used in this research: a secondary longitudinal dataset and an online survey dataset. SPSS programme was used to analysis both datasets. Non-parametric measures were used because the longitudinal data was not normally distributed. The survey data was collected by using online questionnaire with the help of the organisation. The technique of self-selection sampling was used to select respondents. The collaborating organisation approach their members on behalf of the researcher to circulate questionnaire via email.

The secondary longitudinal data is provided by the collaborate organisation which is a self-reported survey dataset of Eco Rewards members' weekly travel behaviour over the period of 27 weeks prior to the data

analysis. The survey data is mainly used to investigate the respondents' travel attitude and antecedents of their travel behaviour. The online survey consists of 18 questions which is organised into three parts. The first part includes a range of attitudinal questions in relation to behavioural change strategies and different transport modes which was selected and tailored based upon Prillwitz and Barr's [26] questionnaire. The second part contains open and closed questions in order to examine respondents' travel behaviour prior to partaking in the Eco Rewards scheme and their experience with the scheme. Content analysis and frequency test were used to analyse the data collected from open-ended questions. The final part investigates participants' basic socio-demographic characteristics.

There were 65 respondents take part in this study wherein 39 males and 26 females, age ranging from 16 to 74, 40% were aged between 45-59 and over 30% of them aged between 30-44, only two participants failed under the age group of 16-19. Accordingly, there is a likelihood of sample bias towards the middle age groups of 30 to 59. Over 65% of the participants were married, followed by 21.5% single and 7.7% divorced. Over 35% of participants had before tax annual income of £40,000 or above, 20% of them had £20,000-£29,999. There were roughly equal proportion of participant that either living with or without children.

3 Results & Discussion

To examine the linkage between the attitude of a particular behaviour and the actual travel behaviour, the first step is to revel the relevant attitudinal factors. Eight behaviour-related attitudinal factors (see Table 1) were identified through factor analysis. Kendall's tau correlation was used to measure the attitude-behaviour nexus and found no significant relationships between them. Accordingly, attitudes have no significant influence on people's actual travel behaviour.

Table 1 Attitudinal factors

	Factor	Item with highest loading	No. of items	Highest factor loading	Eigen value	Cronbach's Alpha
Green travel	Pro-environment	Walking and/or cycling will help to tackle problems like climate change	7	.849	5.961	.887
	Aspiring green traveller attitudes	There is a good level of information about walking and cycling routes and facilities	6	.762	2.005	.787
Public transport	Pro-environment	I feel morally obliged to use public transport	8	.935	5.711	.852
	Public transport user attitudes	Using public transport is convenient	6	.785	2.112	.837
Car travel	Pro-car attitudes	The car offers the greatest travel choices	6	.749	4.835	.824
	Addicted car user attitudes	Using a car is the safest travel choice	7	.735	2.487	.810
Strategy	Supportive intervention	Provide more information about the average rate (benchmark) of my local community's use of different travel options	5	.828	3.580	.802
	Motivational intervention	Provide more financial incentives to people who walk / and or cycle	2	.777	1.484	.750

Source: Authors' calculations based on survey data.

This resonates with Juvan and Dolnicar's [23] finding that there is no linear attitude-behaviour relationship. However, it contradicts with the prediction made by

Böhler et al. [24] that these two variables can be highly correlated when they are being measured on the same level. Likewise, this research also refutes studies of which

suggest that behaviour-specific attitudes can result in pro-environmental behaviour [26]. Moreover, the findings revealed that women were more engaged in green travel modes than men. However, in this study, the proportion of male respondents was larger than females. Accordingly, these contradictory findings might occur due to different adoption of sampling and analysis techniques. The insignificance might be due to small sample size and the unequal gender between respondents. However, the focus of this study is to examine the attitude-behaviour relationship, not the link between gender and attitude, which can be studied in future research.

Despite the argument on attitude-behaviour relationship, socio-demographic factor as a key behavioural measure has also been assessed in this study. The relationship between the socio-demographic characteristics of participants and their travel behaviours were examined using non-parametric tests. Many studies [17, 20] have found that socio-demographic factors can have various influence on travel choice. Unexpectedly, no statistically significant differences were found between participants' socio-demographic characteristics (i.e., age, marital status, household responsibilities, income, car availability, and travel distance) and their travel behaviours in this study. However, intrinsic factors such as peoples' perceptions and attitudes are difficult to change [11]. Therefore, external factors become vital to encourage pro-environmental behaviour which could also indirectly interfering attitudes and intrinsic motivations.

The findings also revealed that convenience and travel cost are two external factors which mostly influence participants' travel decision-making, while intrinsic factors such as moral and environmental concerns are least important (see figure 1).

Figure 1 Other travel motivational factors

This resonates with previous studies which suggest that travel attitude has no significant influence on travel behaviour [11, 26]. It also echoes Kollmuss and Agyeman's [17] research that institutional factors are fundamental to encourage pro-environmental behaviour, as some participants stated:

"Convenience of connections from A to B. Sometimes you have to drive as there are no other options via public transport to reach a destination".

"I would use public transport/bus locally if there is a good network bus route... buses at the moment are far too expensive to use daily to commute, it will work out more

expensive than running a car and a big disadvantage for being inconvenient".

"It would depend on the distance I live from work and the public transport links and whether it is cost effective".

The above three extracts illustrate that institutional factors such as public transport links and travel expenses are crucial for people to partake in green travel. Larsen and Guiver [29] also revealed similar findings which suggest that travel distance is the most factor in travel decision-making, especially in relation to its associated concerns, the involved travel time and costs. The cost in here not only refers to economic cost, but also the associated benefits and intangible experience, as some participants commented:

"If people were of the opinion that cycling is a safe and healthy option more of them would consider it".

"I also cycle to work 2 or 3 days a week which I do for enjoyment, health benefits..."

"Ability to work, rest and chat on train is important for my typical week".

These extracts are in consistent with Larsen and Guiver's [29] research which suggest that pro-environmental travel behaviour could be encouraged by reducing the time cost and promoting slow travel. Besides convenience and costs, participants also concerned with the security and safety issues associated with cycling. For example, the lack of separated cycling routes, bicycle storage space, poor road condition for cycling, and the absence of code of conduct to improve the cycling environment for both cyclists and drivers, as well as their road manner.

4 Conclusions

No relationship was found between people's travel attitude and their actual travel behaviour. Although the finding shows that female tend to engage more on green travel. However, such differences between socio-demographic characteristics (e.g., gender, age, income, age, marital status, and travel distance) and other travel behaviours (i.e., public transport and car travel) were insignificant. Moreover, many people find it hard to adopt a low-carbon lifestyle as their performance of low carbon travel behaviour was mainly influenced by institutional factors such as travel convenience and costs. Therefore, to maximise the efficacy of a behaviour change intervention, a close cooperation between private and public sector is recommended by addressing the most concerned factors such as the supply of public transport and travel costs.

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