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Public Acceptability of Congestion Charging in Beijing, China

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Public Acceptability of Congestion Charging in Beijing, China: How Transferrable are Western Ideas of Public Acceptability?

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Public Acceptability of Congestion Charging in Beijing, China: How Transferrable are Western Ideas of Public Acceptability?

Public acceptability is a major concern for road pricing schemes in Western countries but has not yet been sufficiently studied in the context of Chinese cities, a number of which are considering the introduction of such travel constraint measures. This study explores factors influencing public acceptability of a proposed congestion charge in the City of Beijing. In so doing, the study focuses on understanding the appropriateness of Western frameworks for assessing public acceptability in the Chinese context. Through literature review and focus groups a survey to test different public acceptability constructs was developed (N=1104). A Structural Equation Model was used to analyse relationships that exist among the different aspects of public acceptability. The results demonstrate that public acceptability is dominantly influenced by the level of trust towards the Government and experts. Various determinants in the Western context, such as access to information and perceived effectiveness were not found to have a significant impact on public acceptability. The results imply that public acceptability of congestion charging in the Chinese context has a stronger resonance with wider social issues such as equity than more specific transport problems such as congestion. As such, attempting to present evidence on the anticipated effectiveness of the policy in alleviating congestion and smog may not make the policy more acceptable to the public. The overall inference of the study is that contextual factors are more important than has been previously considered within public acceptability studies.

Keywords: Public acceptability, Congestion charging, SEM, Beijing, Transferability

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1. Introduction

Traffic congestion and transport-related air pollution have become, and remain, two of the most intractable problems in Chinese cities. Despite significant investment in building new road and public transport infrastructures, as well as implementing policies to control car ownership and use, such as Beijing's road space rationing policies (Shen, Kwan, & Chai, 2013) and Shanghai's license auction (Hao, Wang, & Ouyang, 2011),

these problems have never been perceptibly alleviated.

Congestion charging first appeared in public discourse in China right after the implementation of Beijing's end-number license plate restriction policy during the 2008 Beijing Olympic Games. In September 2011, it was first indicated that research on congestion charging in big cities should be carried out in the official document *Guiding Opinions of Further Implementation of Smooth Traffic Project*, jointly issued by four ministries (Ministry of Public Security, et al., 2011). In February 2012, a cadre[1] disclosed the information that congestion charges would be implemented in some big cities by the end of 2012 (Caijing, 2012). In September 2013, Beijing Municipal Environmental Protection Bureau issued a document requiring the Municipal Commission of Transport and Environmental Protection Bureau to set out Beijing congestion charge in the near future (China Daily, 2013).

Smog attracted less attention until reporter Chai Jing's film "Under the Dome" swept across mainland China in 2013 (Powers, 2016), stimulating discussion about air pollution caused by transport. Beijing Emergency Management issued its highest air pollution alert for the first time and made an announcement at 18:00 on December 7, 2015, indicating that all primary schools, junior high schools and high schools should close for three days and suggesting that companies and organizations adopt flexible working times for employees to avoid the worst exposures. In response to the red alert, in 2015 the Beijing Municipal Commission of Transport intimated that a pilot congestion charge would be studied as one part of the Congestion Control Action Plan, aimed at improving the urban street network, encouraging green commuting and reducing traffic congestion (Chinatimes, 2015).

[1] in the Communist Party, a cadre is a party worker or official.

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However, the pilot congestion charge has not yet been brought forward. It has been suggested that this may be due to reported low public acceptability of the policy (e.g. China Youth Daily, 2013; Autohome, 2018). Acceptability can be considered from an individual perspective but may also reflect a more collectively shared judgement about the proposed scheme. According to Wüstenhagen et al. (2007), there are three dimensions of acceptability: (a) social-political acceptance which, on the broadest level, focuses on acceptance of tolls and their distributional effects by policymakers and the general public measured via opinion polls; (b) market acceptance that focuses on willingness-to-pay models; and (c) community acceptance which refers to local responses to the sitting of a congestion charging policy. Although the public acceptability of road charging has been extensively studied in the transport literature, it has rarely been considered in the Chinese context. Moreover, it is questionable whether Western context-based frameworks for analysing public acceptability can simply be transferred to the Chinese context, given the very different philosophical underpinnings, culture, and political system in China. This paper, therefore, contributes to and diversifies the evidence-base by investigating public acceptability of road charging in the Chinese context. Specifically, it compares the literatures about public acceptability from Western contexts with literature from Chinese contexts, looking at similarities in terms and meanings and identifying concepts which do not fit. A survey of residents in Beijing is used to develop relationships between different factors from the literature and measures of acceptability with the aim of comparing the underlying relationships with those reported in the West. The paper demonstrates some important conceptual differences which warn against straightforward cross-cultural transfer of complex socially constructed notions such as public acceptability.

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The paper proceeds as follows. Section 2 reviews relevant literature on public acceptability of congestion charging, including key determinants of public acceptability in the Western context and the rationale for considering the culture-specific determinants in the Chinese context. Section 3 describe the methodology: first, it presents the conceptual framework modified by key findings from a set of focus group discussions; second, it sketches out the survey design and data; third, it introduces the analytical process and model development. Section 4 presents the descriptive results and results of a Structural Equation Model to explore the strength and directionality of relationships. We discuss the results and conclude the research in section 5, reflecting on the broader implications of the work as well as the specific case of congestion charging in Beijing.

2. Attitudinal Factors Influencing Public Acceptability

This section reviews the Western literature on public acceptability of road pricing policies and then compares the findings with similar literature from a Chinese context, augmented with additional cultural insights. Through this, the section identifies some key potential differences between the two literatures which will be explored through the empirical work.

2.1 Determinants in the Western Context

Introducing charges to a service or resources which is traditionally free for the public triggers an intense focus on public acceptability in the literatures. Several frameworks for specifically analysing public acceptability of road pricing schemes have been proposed (Jakobsson, Fujii, & Gärling, 2000; Schade & Schlag, 2003b; Schlag & Teubel, 1997), identifying different key determinants of public acceptability in the Western context. These include: the role of information; perceived effectiveness of the

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proposed scheme; individual freedom; revenue reallocation and transparency; perceived equity; perception of problems; trust in government; and social norms. These are briefly reviewed below.

What people understand a pricing scheme to be (information) impacts on their perceptions of scheme acceptability. Rye, Gaunt, and Ison (2008) identified information as one of the key barriers to the implementation of road user charging in Edinburgh. Understandable details of the proposed scheme were also found to have influence on public acceptability in the US context and in Canada (Bhatt, Higgins, Berg, & Analytics, 2008; Litman, 2005). The complexity of a scheme can lower public acceptability of congestion charging (Bonsall & Lythgoe, 2009; Francke & Kaniok, 2013; O'Grady, Millington, Bacon, Bullock, Taylor, & Viner, 2010).

The perceived effectiveness of a scheme with regards to congestion reduction also plays an important role in obtaining public acceptability (Rienstra, Rietveld, & Verhoef, 1999; Schade & Schlag, 2000; Stead, 2008). Road pricing schemes are more acceptable to people who perceive them as an effective measure (Jaensirisak, Wardman, & May, 2005; Jagers, Matti, & Nilsson, 2017; B. D. Taylor & Kalauskas, 2010).

Individual claims about the restriction of personal freedom (Jakobsson et al., 2000; Jou, Hensher, Wu, & Fujii, 2010; Tertoolen, Van Kreveld, & Verstraten, 1998), car dependency (Eliasson & Jonsson, 2011), and privacy concerns (Borins, 1988; Hau, 1990) were identified as some of the key elements of public acceptability in the framework proposed by Schlag and Teubel (1997). Privacy is more of a concern in the US (Mobility Pricing Independent Commission, 2018; Richardson & Bae, 2008). however, it was not the case in Europe. Link and Polak (2003) undertook a two-stage survey to interview 104 decision makers and 1300 citizens in 9 European countries, the results showed that neither policy makers nor citizens considered privacy issues as a

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major barrier to introducing road pricing schemes. Privacy has not been an issue in the schemes in operation in Gothenburg (Börjesson & Kristoffersson, 2015). As the evidence suggests that Chinese people have a lower privacy concern than Western people (L. Chen & Tsoi, 2011), individual claims are not considered as a determinant in this study.

Revenue reallocation and transparency is identified as another key determinant of public acceptability in the Western literature (Eliasson & Mattsson, 2006; Farrell & Saleh, 2005; Hensher & Puckett, 2007; Santos & Shaffer, 2004; Thorpe, Hills, & Jaensirisak, 2000). Schlag and Teubel (1997) stated that the reason why public acceptability of pricing measures is lower than other restrictive schemes, such as access controls, is that other 'push' measures do not collect revenue. Schuitema and Steg (2008) revealed that the acceptability of pricing schemes increases when car users expect to be compensated for possible negative consequences. Partly related to this issue, the impact of equity issues on public acceptability has been extensively discussed within the literature (Bröcker, Korzhenevych, & Schürmann, 2010; Fujii, Gärling, Jakobsson, & Jou, 2004; Giuliano, 1994; Litman, 2005; Raux & Souche, 2004) with perceived inequity a key reason for public hostility. Viegas (2001) looked at the reasons behind political hostility towards road pricing schemes, indicating a central role for perceived inequity and accountability issues. Both the distribution of additional costs and who benefits from the income that they generate are thought to matter (Schlag & Teubel, 1997).

All the aforementioned factors are influenced by general environmental attitudes (Eliasson & Jonsson, 2011), general perceptions of congestion or pollution problems that should be solved (Oehry, 2010; Schade & Schlag, 2003a), as well as public awareness of possible solutions to mitigate these problems (Bird & Morris, 2006).

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Without problem acceptance, the solution acceptance is low (Eriksson, Garvill, & Nordlund, 2008; Schade & Schlag, 2000). However, according to B. Taylor and Brook (1998), well recognised traffic problems do not necessarily lead to high public support for new policies. Schmöcker, Pettersson, and Fujii (2012) have identified 'trust in government' as a key determinant of public acceptability of congestion charge policies (Gaunt, Rye, & Allen, 2007; Kim, Schmöcker, Fujii, & Noland, 2013; McQuaid & Grieco, 2005). A problem can be accepted but government not then trusted to put in place an effective solution to it.

There is evidence that social pressure is positively connected with the acceptability of transport pricing measures. For instance, Schade and Baum (2007) found that motorists are more likely to accept the charge if they believed the charge is an inevitable measure. Börjesson, Eliasson, Hugosson, and Brundell-Freij (2012) analysed the successful experience of implementing congestion charge in Stockholm and indicated that with all political parties' support for the charges, the acceptance was improved. It is suggested that public acceptability of pricing schemes could be improved in case that social norms are changed in a favourable way towards road pricing (Schade & Schlag, 2003a).

2.2 Culture-specific Determinants in the Chinese Context

Chinese scholars started to include public acceptability in their research on the effectiveness of car ownership controlling policies recently (Xiaohong Chen & Zhang, 2012; Xiaojie Chen & Zhao, 2013a; Hao et al., 2011). Xiaojie Chen and Zhao (2013a) surveyed attitude towards several transport policy options in Shanghai, including a congestion charge. They concluded that almost all options which require personal sacrifices are unlikely to be acceptable, especially congestion charging.

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Xiaojie Chen and Zhao (2013b) used structural equation models to study the acceptance of Shanghai car license auction policy but they did not consider attitudinal factors in the study. Xiaojie Chen and Zhao (2013a) also sketched a framework to investigate public acceptance of the car license auction policy but again without pre-scheme attitudinal variables. Government vehicles2 were identified as a key factor influencing public acceptance of the policy as citizens believe government vehicles have advantages in obtaining vehicle licenses and contribute significant amounts of traffic.

Some scholars have studied the cultural and political factors influencing the effectiveness of transport policies in the specific Chinese context (de Jong, 2012; Wang, 2010), but most of scholars analyse Chinese transport policies by simply applying Western context-based frameworks without adapting them to the Chinese context (Sun, Feng, & Lu, 2016). Although the complex framework proposed by Xiaojie Chen and Zhao (2013a) did include some culture-specific determinants, the selection criteria for these variables was not well explained. We would suggest that there are at least three cultural specificities that are important in the case of congestion charging, in addition to government car use.

Firstly, the term 'to accept' is an initiative act to approve or consent to a proposed scheme in the Western context. This is not the case in the Chinese context. The Confucian-Legalist way to maintain social stability depends on promulgating the sense of hierarchy and the willingness to sustain the rigid social hierarchy (Jacobs,

[2] Government vehicles include vehicles belonging to the Party and government organs, government-sponsored public institutions and state-owned enterprises. Such vehicles would be exempt from charges or they would be paid by the state.

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Guopei, & Herbig, 1995; Kutcher, 2000; Y. B. Zhang, Lin, Nonaka, & Beom, 2005). With the obsession of the immense hierarchical system, people are given a clear social identity, and discouraged from jeopardizing these identities by acting outside of their social norms. A social norm of obedience to authority is formed to drive the public to conform to traditional standards of behaviour that the ruling classes require. Thus, dominated by such a social norm, in most cases obedience to authority is the most proper way to act for the majority of citizens who are at low levels in the hierarchical system (Kelman & Hamilton, 1989).

Secondly, we can discern an egalitarian tendency in the Chinese notion of social equity (Liu, Lucas, Marsden, & Liu, 2019). Egalitarianism in China appears to manifest occasionally as extreme egalitarianism whereby society is considered better off if resources are taken away from a rich person without any redistribution to poorer people. Hence, underlying income inequities may not be perceived as a problem in the same way as that in the West and distributional issues are focussed on different hierarchical structures and winners and losers.

Thirdly, it is widely reported that migrants are unfairly treated because the hukou registration system officially identifies them as a resident of another area (Chan & Zhang, 1999; Liang, 2015). Rural-urban migrants have been experiencing systematic injustices, including restricted access to housing and local schooling (Chan & Buckingham, 2008; Tao & Xu, 2007). As any congestion charge may further increase migrants' economic burden the research design had to investigate whether perceived hukou-related equity influenced public acceptability. Whilst the review has highlighted some potentially important differences between the West and China, these differences were explored further to modify the conceptual framework through focus group discussions (see section 3.2).

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3. Research Design & Analysis Approach

3.1 General Research Design

Although a mixed method approach was adopted for the study as a whole, for reasons of brevity this paper only reports on its quantitative elements. In the full study design, qualitative data was used for an in-depth exploration of the complex nature of the public acceptability issue and people's concerns about the proposed scheme in the Chinese context (reported in Liu et al., 2019). This helped in the design of a quantitative representative sample survey with 1104 valid responses, which was then used to collect measurable public attitude towards congestion charging from of the population to develop a framework for assessing public acceptability in the Chinese context for testing the main hypothesis.

3.2 Survey Design & Data

Based on a comprehensive review of the literature and qualitative explorations conducted prior to the survey, a framework was proposed to organise determinants of public acceptability (shown in Figure 1). Three to five quotes from focus group participants that corresponded to the main themes emerging were selected and then assigned to their relevant theoretical constructs. Among them, some constructs were asked in a similar way to Western methods to test whether those constructs are relevant, including problem perception, perceived effectiveness, and acceptability of congestion charging. Items in other constructs were more cultural specific, but nonetheless can properly reflect the way Chinese respondents may perceive transport inequities, trust issues, and social conformity. Finally, a total of 78 representative statements were initially selected to form a pilot survey.

Insert Figure 1 about here

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All statements were recorded as a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). An even numbered scale was adopted in this study because even-numbered scales can force the respondent to commit to a certain position (Brown, 2000). This is preferred because giving a neutral response to questions may be a result of absentmindedness or using the non-committal option for political equivocation in this context. Moreover, Raaijmakers, Van Hoof, t Hart, Verbogt, and Vollebergh (2000) revealed that neutral responses are more frequently expressing "don't know" instead of a neutral position. Since the statements in the questionnaire are quite straightforward, it is unlikely that respondents cannot express their opinions about the statements. Besides, 6-point Likert scales have been found to have higher reliability than 5-point scales (Chomeya, 2010).

The statements in the final survey were refined through a pilot online survey which was conducted in September 2017. 126 respondents with a background in psychology, sociology or political science were asked to do the pilot survey and give feedback. Cronbach's α values of each construct were calculated to test the internal consistency. We took 0.7 as the acceptable level of internal consistency (Tavakol & Dennick, 2011). Items were eliminated if removing the items increased the Cronbach's α value to the acceptable level 0.7. Some items were also eliminated because they were deemed to be ambiguous, misleading, or politically sensitive according to the feedback from the pilot survey participants.

The shortened survey with 49 attitudinal questions (shown later in Table 3) was conducted in November 2017. Hard-copy questionnaires were distributed and completed on-street at commercial areas, bus stops, city parks, and residential areas in various districts of Beijing. A final sample of 1104 valid responses was obtained. Table

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2 reports the socio-demographic information of the sample. The sample is compared to the Beijing population in general (Beijing Municipal Bureau of Statistics, 2017).

People residing outside the fifth ring road (51%) are underrepresented in the sample (23.9%) while the sample has more people living within the third ring road (33.8%) and between the third and fifth ring road (42.3%) than the Beijing population (18.8% and 30.2 respectively). For a city the size of Beijing it is difficult to attain representative population samples, but, the sample may contain more native Pekingese and richer people than are represented in the Beijing-wide population; because the housing price inside the third ring road is higher and 51.6% of permanent migrant population reside outside the fifth ring road (People's Daily, 2015). People residing outside the fifth ring road are underrepresented in the sample which may have influenced the impact of perceived hukou-related inequity. As the focus of this study is on understanding the significance of different acceptability constructs rather than on determining a representative pan-Beijing response to the charge this slight bias in the sample is not seen as too problematic for the analysis nor requiring weighting of the sample.

Insert table 2 about here

3.3 Analysis Approach

Structural Equation Modelling is a form of causal modelling which includes a set of mathematical and statistical models that fit structures of constructs to data (Kaplan, 2008). SEMs are widely used in social sciences to represent the causal influences of exogenous variables on endogenous variables, as well as the causal relationship between different endogenous variables (Cuttance & Ecob, 2009; MacCallum & Austin, 2000). According to X. A. Koufteros (1999), X. Koufteros, Vonderembse, and Doll

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(2001) and Golob (2003), the analytical approach included an exploratory factor analysis (EFA), a confirmatory factor analysis (CFA), and the testing of the structural model (shown in Fig. 2).

Insert Figure 2 about here

An exploratory study was conducted to identify latent variables underlying the complete set of items (implemented in SPSS Package). Corrected item-total correlations were then used to eliminate items which are inconsistent with the average behaviour of the others in the set (Howard & Forehand, 1962). The commonly adopted bound of acceptable corrected item-related correlation is 0.35 (Beck, Steer, & Brown, 1996). Also, an item should be deleted if there was another item with an item-total correlation greater than 0.9 (Kriston, Scholl, Hölzel, Simon, Loh, & Härter, 2010). The corrected item-total correlation tests were performed for each construct. The results showed that the statements are reliable to measure their intended constructs as the corrected item-total correlations ranged from .382 to .890.

A within-block factor analysis was conducted before subjecting all items to check the within block dimensionality (Houston, 2004; Schlegel, Grandjean, & Scherer, 2012). CFA was employed to test the within block dimensionality in this study (Ziegler & Hagemann, 2015). The loadings of problem perception items are relatively lower (ranged from 0.722 to 0.786) than items in other blocks (ranged from .835 to .965). In general, there is sufficient evidence of unidimensionality.

An EFA of the entire set of variables was then conducted to extract main factors. Principal component analysis (PCA) and principal axis factoring (PAF) are two widely used methods for factor extraction. Researchers conduct a factor analysis assuming that latent constructs or a causal model exists, however PCA is merely a variable reduction technique (Bentler & Kano, 1990; Kambhatla & Leen, 1997; Khodadady & Hashemi,

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2010). Thus, PAF was selected for this study because its intention is to identify latent variables that contribute to the common variance (Kline, 2015; Widaman, 1993).

Two types of rotations can be used to identify factors: the orthogonal rotation method and the oblique rotation method (Churchill & Iacobucci, 2006). Orthogonal rotations assume that the factors are not correlated, while oblique rotations assume there are correlations between factors (Jolliffe, 1986). Osborne, Costello, and Kellow (2008) argue that although orthogonal rotation produces more easily interpretable results, it may neglect the interconnectedness between different factors . Since some factors are sub-constructs under more general constructs, correlations between these sub-constructs were expected. Also, according to the literature, there might be correlations between different constructs, for example trust and perceived equity could be closely interacted. Therefore, the oblique rotation method was employed in this study.

The resulting exploratory solution indicated an eight factor solution. The eight factors that had eigenvalues greater than 1.0 explained 72% of the variance. Factor loadings which represent the strength of the relationship between the item and the factor were used as indicators to interpret the role each item plays in a factor. 0.6 was used as a cutoff point for deciding whether the item has a significant contribution to the corresponding factor (Hair, Anderson, Tatham, & Black, 1984). Moreover, we examined whether these factors represent meaningful constructs because a factor should only be retained if it could be interpreted in a meaningful way no matter how solid the empirical evidence for its retention (Worthington & Whittaker, 2006).

All items measuring trust in government and trust towards experts loaded on one single factor labelled ‘trust’, items measuring information about congestion charge and social media loaded on one factor labelled ‘access to information’, and items measuring

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obedience to authority and conformity to social norm loaded on one factor labelled 'cultural factors'.

Factor five represented problem perceptions including perception of congestion and smog. However, problem perception items were eliminated because all of the loadings were below the cutoff point 0.6 and the Cronbach's alpha value of factor five was lower than 0.7. Although factor loadings of items related to government car use for all factors were below 0.5, they were retained as another factor because there is strong evidence from the literature and focus groups showing that the perception of government car use influences public acceptability of policies in the Chinese context (Xiaojie Chen & Zhao, 2013a; Guo, 2010).

All other items loaded on their intended construct. After eliminating problem perception items, the lowest factor loading stood at 0.658 which confirmed that items loaded strongly on their intended factors. Also, none of these three items had cross-loadings greater than 0.40. Items that significantly load on multiple factors should be removed even though they may be critical to measure the factor sometimes. It is because: (a) items that had significant cross-loadings are difficult to interpret, (b) cross-loadings might be attributed to statistical artifact (Yoo & Donthu, 2001). The cross-loaded factor (factor 8) did not account for as much as 25% of the variance in the item (Podsakoff, Ahearne, & MacKenzie, 1997). Therefore, no item needed to be removed because of high cross-loading.

After conducting the EFA, Cronbach's alpha values for each factor were used to evaluate reliability. The Cronbach's alpha values of other constructs were above the satisfactory value 0.75, ranged from 0.853 to 0.958. Since the EFA is usually considered as a preliminary because the unidimensionality cannot be directly assessed, the CFA was employed to test whether the data confirm the generated model (Garver &

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Mentzer, 1999; Lu, Lai, & Cheng, 2007). The software package, AMOS 20, was used to conduct the CFA in this study.

Convergence validity was assessed using t-values (Dunn, Seaker, & Waller, 1994) with an absolute value of 1.96, which corresponds to a 0.05 level of significance, as the acceptable cut-off point for statistical significance (Byrne, 2016). All of the observed variables exceeded the critical ratio at the 0.05 level of significance. Item reliability was estimated by R^2 values with 0.50 as the acceptable cut-off point for reliability (Bollen, 1989). The squared correlations ranged from 0.558 to 0.902, provided the evidence of acceptable item reliability.

Structural Equation Modelling (SEM) was employed to specify the causal relationship between the different determinants and levels of public acceptability. Multiple goodness-of-fit measures which provided by AMOS 20 were used to assess the fit of the structural model to the observed data including normed Chi-square, GFI, AGFI, SRMR, RMSEA, NFI, and CFI (Hooper, Coughlan, & Mullen, 2008).

4. Results

4.1. Descriptive Results

As shown in Table 3, the overwhelming majority of respondents had a high level of problem perception. Approximately three-quarters of respondents thought they do not have enough information about the policy. Also, congestion charge was perceived more effective than previous transport policies such as traffic restrictions based on the last digit of license plate and license plate lottery.

More than three-quarters of respondents felt the policy is unfair to poorer people but about half of the respondents thought the policy is inequitable to those who do not have the Beijing hukou. Government car use was perceived as a serious problem.

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Further, the surveyed sample had a very low level of trust in government and trust towards experts. Moreover, the results show a relatively high level of obedience to authority and conformity to social norms.

The overall acceptability of congestion charge is low: more than three-quarters of respondents did not want it implemented. 31.8% of the respondents thought the policy is favourable to the society as a whole, while only 16.5% of respondents indicated that the policy is favourable to themselves.

Insert Table 3 about here

4.2 Model Test

Based on the modified conceptual framework, Figure 3 shows the schematic diagram that specifies the endogenous variables and their corresponding exogenous variables. In the diagram, indicators (observed variables) are represented by squares, while constructs (latent variables) are represented by oval-shaped circles. Multiple goodness-of-fit measures provided sufficient evidence that the observed data is represented by the hypothesised model ($\chi^2 = 1564.394$, df = 558, $\chi^2/df = 2.803$, GFI = 0.916, AGFI = 0.880, CFI = 0.933, RMSEA = 0.058[3]). Discriminant validity is tested by comparing the average variance extracted (AVE) with the squared correlation between constructs. All of the squared correlations were lower than the AVEs, which provided evidence of discriminant validity for all the constructs. Table 3 presents the standardised estimates of the final model, and Figure 4 manifests the relationships between public acceptability and its determinants.

[3] (A)GFI: (Adjusted) Goodness of Fit; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation

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Insert Figure 3 about here

Table 4 presents the standardised estimates of the model. Cultural influences which consist of obedience to authority and conformity to social norms had a considerably strong direct effect (.534) on trust issues. Trust issues which consist of trust in government and trust towards experts are related to most of the other constructs. Among them, perceived income inequity, perception of government car use, and public acceptability are highly correlated with trust issues and the path coefficients are 0.693, 0.516, and 0.600 respectively. Also, perceived income equality and perceived government car use were found to have significant direct effects on the level of public acceptability (.094 and .145 respectively).

Although access to information is directly related to perceived effectiveness of previous policies and congestion charging, no significant relations are found between acceptability and these three constructs. Likewise, the relationship between perceived hukou related social inequity and public acceptability of congestion charging is not supported.

However, only examining the direct effects can lead to misinterpretation of relationships with the data, since constructs are interconnected and indirect effects could sometimes be rather strong. For example, the indirect effect of 'Cultural Influence' on 'Public Acceptability' (.440) is greater than its direct effect (.111). The total effect of one construct on another is the sum of the direct effect and all indirect effects from the first construct acting through all intermediate constructs on the second construct. The standardised total effects are shown in Table 5 and figure 4 presents the relationship between public acceptability and its determinants. The arrows in Figure 4 symbolise direct effect between two constructs. Paths that do not have significant direct effects on public acceptability are not presented.

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Insert Table 4 about here

Insert Table 5 about here

Insert Figure 4 about here

5. Discussion and Conclusion

This paper set out to explore the extent to which public acceptability, and in particular representations of public acceptability found in the Western literature, might be appropriate to the context of congestion charging in Beijing. To better understand the factors that have potential influence on public acceptability of the policy, a survey with 49 attitudinal questions was developed based on the literature and results from focus groups. The survey was conducted in Beijing and a sample of 1104 valid responses was obtained. The SEM was applied to analyse the data.

The results show that trust in government and trust towards experts play a dominant role in respondents' support for congestion charging. This corroborates previous research (Kim et al., 2013) that trust has the strongest effect on public acceptability of congestion charge. This is distinct from the Western context because it seems to relate, drawing on the focus groups, to belief in whether government is fully acting for the citizens when there is no alternative political choice in prospect. The results verify the hypothesis that obedience to authority and social norms have a significant impact on public acceptability in the Chinese context. The results are in line with the Western literature that public acceptability is influenced by perceived fairness (Jakobsson et al., 2000) but this extends to perception of government car use (Xiaojie Chen & Zhao, 2013a).

Other determinants are not supported in the Chinese context, such as access to information and perceived effectiveness of the proposed scheme that have previously

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been identified as important in the Western context. In agreement with the result from Nanjing (Sun et al., 2016), we conclude that perceived effectiveness does not affect public acceptability in the Chinese context. Together, the dominant influence of trust, perceived inequity, and obedience, as well as a lack of consideration of the effectiveness are the main differences between public acceptability in the Western and Chinese context.

Compared to Western frameworks, public acceptability is a relatively less complex issue in the Chinese context. Many previously identified factors influencing public acceptability are missing in this framework. It is because most of empirical results in the literature are based on a presumption that public acceptability of a policy is a collective result of citizens' choices depending on balancing costs and benefits (Gärling & Schuitema, 2007; Hårsman & Quigley, 2010; Schade & Schlag, 2003a). Policy-makers, therefore, need to convince citizens that the benefits of congestion charging outweigh the cost to acquire public support in the Western context by offering detailed and understandable information to convince the public that the proposed scheme could effectively fulfil its policy objectives. Due to China's polity, the policy-making process is different from the West (Lieberthal & Oksenberg, 1990; G. Wu, 2015), which may lead to the key differences in public acceptability. Chinese people are assumed indifferent about detailed information about policies which are still at the planning stage by government, hence, access to information is regarded as unnecessary to acquire public support in the China. Secondly, the abovementioned assumption has led to an expert-cult phenomenon (H. Zhang & Chen, 2004). It is pervasive that the government only consults with 'experts' instead of seeking opinions of the public (Zhao, 2005). Therefore, citizens do not have experiences of personally evaluating the effectiveness of a proposed scheme. As a result, public acceptability depends largely on

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people's attitudes towards the government and experts but is not very much affected by citizens' perception of the effectiveness of the policies that might be under scrutiny. However, the effectiveness of previous policies which were widely endorsed by experts have often not met citizens' expectations. This could explain respondents' hostility to experts and the lack of importance of information.

To sum up, because of the strong central power and limited political freedoms in an authoritarian regime (Lee & Zhang, 2013; Levitsky & Way, 2010; Shorten, 2012; Teets, 2013), individuals are subordinate to the country and personal interests are discouraged from consideration. As the relationship between the state and the individual are so distinct, many of the constructs which exist in Western acceptability studies are either inappropriate or subject to quite different interpretations. Whilst our sample does not allow scaling up to understand Beijing wide acceptance of the congestion charging policy, it appears that as acceptance is strongly affected by the general attitude towards government, in the short-term, it is unlikely to obtain public support for a particular policy which may alleviate the problem.

There are many shortcuts to improve public support for congestion charging in short-term. Firstly, the government can launch propaganda campaigns to increase people's general attitudes towards the Party. Secondly, efforts could be made to convince different groups of people that other population groups sacrifice more because of the proposed scheme. Thirdly, anti-corruption campaigns which focus on private use of government cars can be helpful to generate public support for this policy. However, these measures cannot have long-term effects.

To cope with low acceptability of this policy and other policies in a longer-term, some fundamental changes in the relationship between the government and the people are necessary. Efforts should be made to encourage lay-citizens to participate in

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policymaking by providing access to information and secured channel to gather public opinions. To eliminate the preconceived idea that the purpose of implementing a charging policy is to collect money from the public, the government should attempt to consult with lay-citizens about revenue management and the revenue allocation should be transparent. Official's asset disclosure (including assets overseas) could be the silver bullet for people's perception of corruption. However, all these measures require institutional changes which are highly unlikely to happen in the near future.

This research has several limitations. Firstly, many other cultural factors identified in the focus groups were not included in the survey as they are difficult to quantify. Secondly, in Beijing terms, this is a very small sample. Thirdly, the effects of problem perception were not tested because of the low internal consistency of the two problem perception constructs. Fourthly, since the policy was still at the planning stage when the survey was conducted, the results may only reflect the acceptability of a general concept of congestion charge instead of a concrete policy. There is evidence that attitudes toward congestion pricing become more negative as details of a policy emerge and the familiarity with an implemented charging system increases acceptability again (Mobility Pricing Independent Commission, 2018). Nonetheless, the results are sufficiently clear to suggest that it is not appropriate to simply adopt Western ideas of policy acceptability and attitudes when researching transport policies in a Chinese context.

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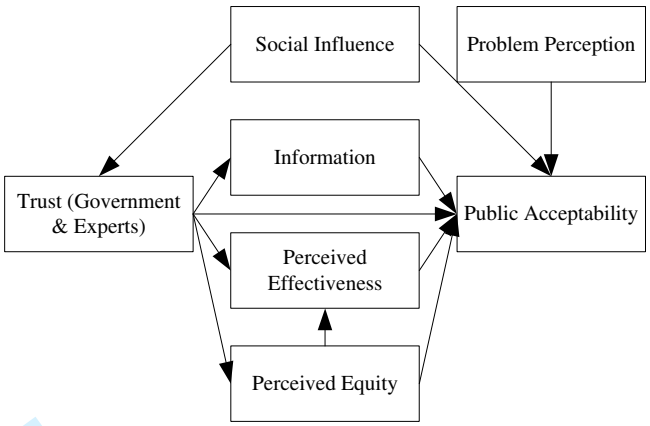

Figure 1 Framework for Public Acceptability of Congestion Charging in the Chinese Context

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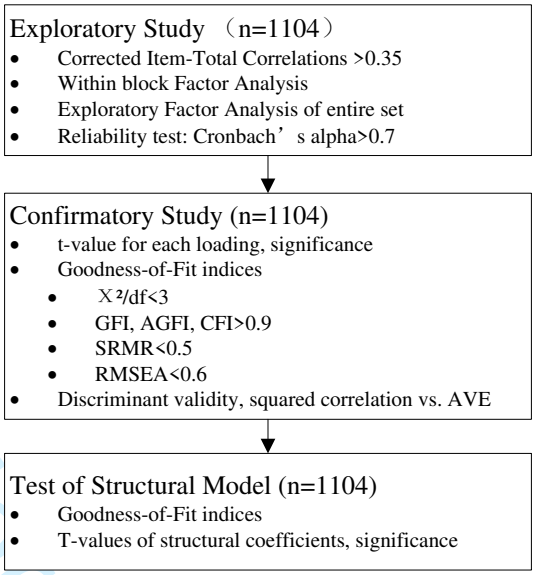

Figure 2 Analytical Approach

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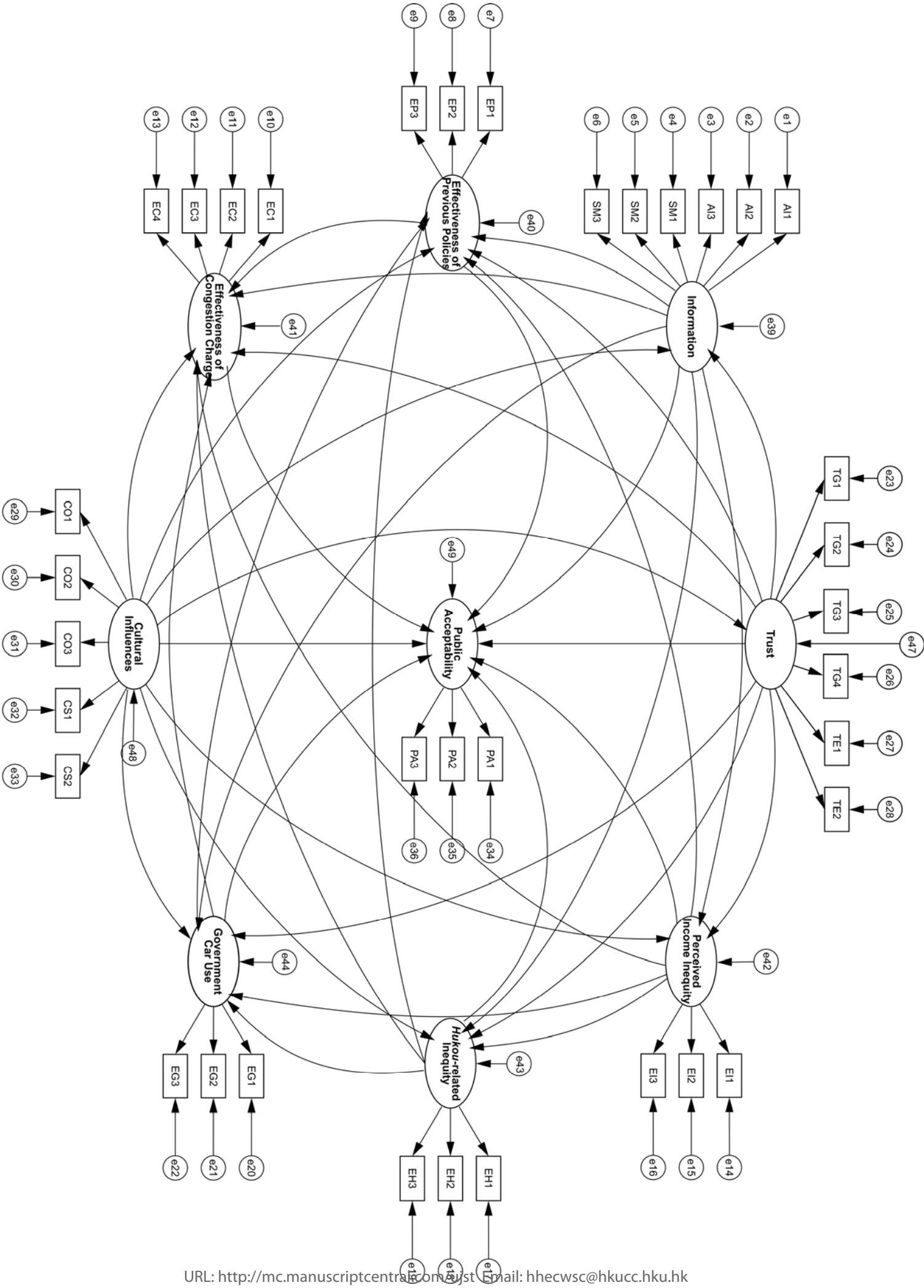

Figure 3 Measurement Model

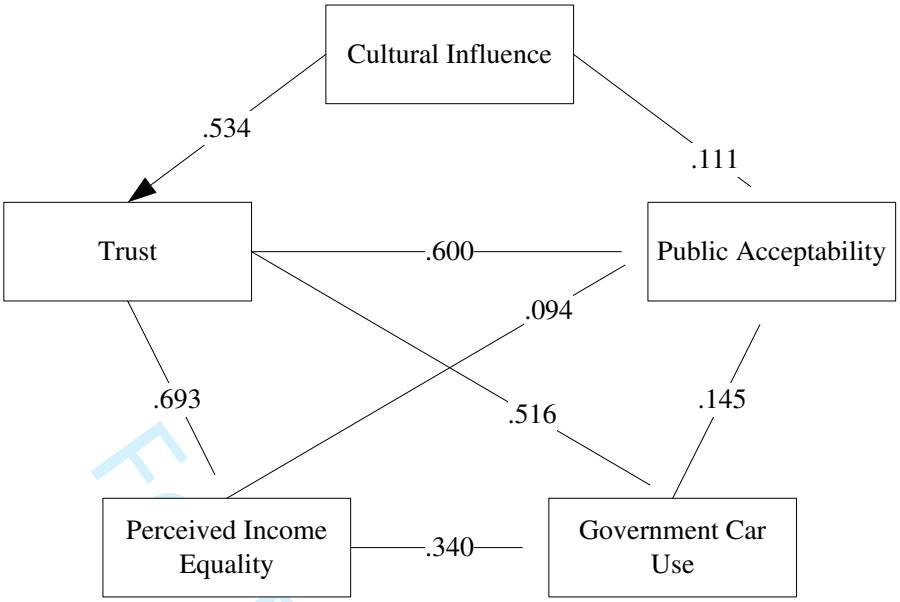

Figure 4 Key Determinants of Public Acceptability in the Chinese Context

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Table 1 Potentially Relevant Determinants in the Chinese Context

Determinants in the Western Context	Determinants from Focus Groups
Information	(no) Access to Information
	Information from Social Media
Perceived Effectiveness of Congestion Charging	Perceived Effectiveness of Congestion Charging
	Perceived Effectiveness of Previous Policies
Individual Freedom	
Revenue Reallocation & Transparency	
Perceived Equity	Perceived Income Inequity
	Perceived *hukou*-related Inequity
	Government Car Use
Problem Perception	Perception of Congestion
	Perception of Smog
Trust in Government	Trust in Government
	Trust towards Experts
Social Norms	Obedience to Authority
	Conformity to Social Norms

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Table 2 Socio-demographic Information of The Sample

		Frequency	Percentage	Beijing
Heard about the Congestion Charging	Yes	1060	96.0	
	No	44	4.0	
Age	18-30	342	31.0	24.6
	31-45	336	30.4	26.4
	46-60	285	25.8	21.8
	Above 60	141	12.8	14
Gender	Male	552	50.0	51.6
	Female	552	50.0	48.4
Annual Household Income (CNY)	<120k	430	38.9	
	120k-1m	531	48.1	
	>1m	143	13.0	
Pekingese/Migrants	Pekingese	468	42.4	
	Migrants	636	57.6	
Residential Area	six inner city districts (inside the 3rd ring road)	373	33.8	18.8
	six inner city districts (outside the 3rd ring road)	467	42.3	30.2
	other districts	264	23.9	51
Car Ownership	Car Owner	755	68.4	
	Non-car owner	349	31.6	

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Table 3. Indicators of determinants of public acceptability

Construct	Item	Disagree (%)	Agree (%)	Mean
Perception of Congestion (Cronbach's alpha=.566)	PC1 - Congestion is a serious problem in Beijing	.1	99.9	5.59
	PC2 - Traffic congestion has a great effect on my daily life	.6	99.4	5.05
	PC3 - I'm always delayed because of bad traffic on the road	10.1	89.9	4.58
Perception of Smog (Cronbach's alpha=.587)	PS1 - Smog is a serious problem in Beijing	.6	99.4	5.86
	PS2 - Smog is harmful to my health	5.9	94.1	5.02
	PS3 - I pay close attention to the smog problem	1.4	98.6	5.48
Information about Congestion Charge (Cronbach's alpha=.854)	AI1 - I know when the policy is going to be implemented	87.8	12.2	1.98
	AI2 - I know how much I need to pay	72.7	27.3	2.68
	AI3 - The government introduces experience in foreign cities	76.0	24.0	2.60
Social Media (Cronbach's alpha=.902)	SM1 - I can find useful information about the congestion charge on social media	53.2	46.8	3.21
	SM2 - My opinion of congestion charging is mainly based on information from social media	56.2	43.8	3.14
	SM3 - Articles on social media help me to better understand the congestion charge	33.2	66.8	4.00
Perceived Effectiveness of Previous Transport Policies (Cronbach's alpha=.906)	EP1 - Traffic restrictions based on the end-number of the license plate has effectively alleviated traffic congestion	75.7	24.3	2.67
	EP2 - License plate lottery has effectively alleviated traffic congestion	77.9	22.1	2.58
	EP3 - Previous transport policies can reach policy-makers' expectation	82.8	17.2	2.47
Perceived Effectiveness of Congestion Charge (Cronbach's alpha=.889)	EC1 - A policy which has been successfully implemented in foreign countries could be effective in China	68.0	32.0	2.97
	EC2 - The congestion charge could effectively alleviate traffic congestion in Beijing	43.1	56.9	3.65
	EC3 - The congestion charge could effectively alleviate smog problem in Beijing	74.2	25.8	2.62
	EC4 - People will use car less because of the congestion charge	28.1	71.9	3.94
Perceived Income Inequalities (Cronbach's alpha=.942)	EI1 - The policy is inequitable to poorer car users	21.7	78.3	4.61
	EI2 - The policy will cause more social inequalities	22.6	77.4	4.58
	EI3 - The policy will make driving another privilege of the rich	22.6	77.4	4.56
Perceived Hukou Related Inequities (Cronbach's alpha=.937)	EH1 - The policy is inequitable to new migrants	46.8	53.2	3.66
	EH2 - People who don't have a Beijing hukou should not pay this charge	70.8	29.2	2.56
	EH3 - Pekingese are the main beneficiaries of the policy	57.7	42.3	3.21
Perceived Government Car Use (Cronbach's alpha=.853)	EG1 - The policy will have constraints on government car use	88.1	11.9	2.02
	EG2 - Government car users themselves will pay the charge	84.4	15.6	2.16
	EG3 - Government car use for private purpose is very rare	94.9	5.1	1.54
Trust in Government (Cronbach's alpha=.932)	TG1 - The government want to implement this policy in order to collect money from the public	25.5	74.5	4.34
	TG2 - Other social problems caused by this policy will not be policymakers' concerns	25.5	74.5	4.30
	TG3 - The policy cannot reach my expectation because of political corruption	18.0	82.0	4.75
	TG4 - The revenue allocation will not be transparent	4.7	95.3	5.31
Trust towards Experts (Cronbach's alpha=.911)	TE1 - Congestion charging is not as good as experts said	22.2	77.8	4.54
	TE2 - Experts are flattering cadres	18.7	81.3	4.68
Obedience to Authority (Cronbach's alpha=.888)	CO1 - I will not express my dissatisfaction publicly	26.5	73.5	4.25
	CO2 - Even if I'm not happy with it, I will do whatever the government requires me to do	24.9	75.1	4.35
	CO3 - Cadres could make the right decisions for me	62.0	38.0	2.93
Conformity to Social Norm (Cronbach's alpha=.925)	CS1 - I will find it more acceptable if people around me think it's acceptable	37.6	62.4	3.89
	CS2 - I will find it more unacceptable if people around me complain about it	36.7	63.3	3.90
Public Acceptability (Cronbach's alpha=.958)	PA1 - In general I hope the policy will be implemented	77.1	22.9	2.48
	PA2 - I think the policy is favourable to me as an individual	83.5	16.5	2.07
	PA3 - I think the policy is favourable to the society as a whole	68.2	31.8	2.95

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Table 4 Standardised Estimates of the Model

Variables			Estimate	S.E.	C.R.
Trust	←	Cultural Influence	**.534**	.060	9.428
Information	←	Cultural Influence	**.171**	.049	2.860
Information	←	Trust	**.149**	.036	3.170
Income Equality	←	Trust	**.693**	.044	16.641
Income Equality	←	Cultural Influence	-.076	.046	-1.824
Income Equality	←	Information	.035	.042	1.134
Hukou Related Equity	←	Trust	.100	.069	1.939
Hukou Related Equity	←	Income Equality	**.508**	.059	11.016
Hukou Related Equity	←	Information	**.080**	.058	2.440
Hukou Related Equity	←	Cultural Influence	**-.177**	.058	-4.309
Government Car Use	←	Trust	**.516**	.024	10.886
Government Car Use	←	Income Equality	**.340**	.021	7.946
Government Car Use	←	Hukou Related Equity	-.033	.012	-1.069
Government Car Use	←	Cultural Influence	**.077**	.019	2.268
Government Car Use	←	Information	-.015	.019	-.544
Effectiveness of Previous Policy	←	Information	**.289**	.039	6.472
Effectiveness of Previous Policy	←	Cultural Influence	.077	.031	1.723
Effectiveness of Previous Policy	←	Trust	**.186**	.040	3.037
Effectiveness of Previous Policy	←	Government Car Use	**.138**	.082	2.141
Effectiveness of Previous Policy	←	Income Equality	-.063	.036	-1.096
Effectiveness of Previous Policy	←	Hukou Related Equity	-.037	.019	-.941
Effectiveness of CC	←	Trust	.034	.047	.544
Effectiveness of CC	←	Government Car Use	**.153**	.097	2.286
Effectiveness of CC	←	Income Equality	-.067	.041	-1.161
Effectiveness of CC	←	Information	**.306**	.046	6.428
Effectiveness of CC	←	Cultural Influence	-.007	.035	-.168
Effectiveness of CC	←	Effectiveness of Previous Policy	**.202**	.042	5.494
Effectiveness of CC	←	Hukou Related Equity	.034	.022	.849
Public Acceptability	←	Cultural Influence	**.111**	.027	4.640
Public Acceptability	←	Trust	**.600**	.038	16.689
Public Acceptability	←	Information	.037	.030	1.727
Public Acceptability	←	Effectiveness of Previous Policy	.026	.032	1.279
Public Acceptability	←	Effectiveness of CC	.034	.029	1.677
Public Acceptability	←	Perceived Income Equality	**.094**	.032	3.011
Public Acceptability	←	Hukou Related Equity	.038	.017	1.783
Public Acceptability	←	Government Car Use	**.145**	.075	4.002

Notes: Bolded text indicates significant at 95%

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Table 5 Standardised Total Effects

	Public Acceptability of Congestion Charge		
	Direct Effect	Indirect Effect	Total Effect
Cultural Influence	.111	.440	**.551**
Trust	.600	.210	**.811**
Information	.037	.026	.063
Income Equality	.094	.065	**.159**
Hukou Related Equity	.038	-.005	.033
Government Car Use	.145	.010	**.154**
Effectiveness of Previous Policy	.026	.007	.033
Effectiveness of Congestion Charge	.034	-	.034

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