Impacts of travellers' social awareness on the intention of bus usage

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1. Introduction

The growth of private car use is commonly seen as one of the major causes of environmental concerns and social problems [1]. This led to a focus on transportation policies that seek to reduce private car use by providing other alternatives. Among substitute transportation modes, public transportation was seen as an appropriate alternative to support the policy [2].

The literature on mode-use behaviour studies showed that the psychological approach was a likely alternative compared to the conventional approach. The conventional approach was based on the random utility approach, which has a weakness in terms of describing human behaviour. According to Pronello and Camusso [3], travellers' transportation mode behaviour is not often a result of expected thought. In addition, the theory of individual selection behaviour, which was a basis for the conventional approach, cannot explain all aspects of behaviour [4]. As such, a notion of sustainable development, with consideration for sociology and psychology, has been concretely examined in transportation studies [5].

Studies pursuing the psychological approach for mode use behaviour identified two main trends. The first trend was based on the self-interest motive and the second on the pro-environmental motive [6]. A typical representation of the self-interest models could be the theory of planned behaviour (TPB) [7]. The models were based on the cost-benefit mechanism to predict traveller choice. Widely known variables in self-interest-motive models include attitude, social norms, perceived behavioural control (PBC) and intention. Researchers based the pro-environmental models on the norm-activation model (NAM) [8] to explain travellers’ behaviour. Variables commonly investigated in the NAM model were personal norm, environmental awareness of consequences and environmental awareness of need. In the context of travel mode choice, personal norms were understood as an obligation to use a specific transportation mode.

Comparisons between the self-interest models and pro-environmental models showed the self-interest models to have a better predictive ability. Bamberg & Schmidt [9] investigated the roles of self-interest components and normative-based components in the intention of car use and self-reported car use. Their findings indicated that self-interest-based variables perform better compared with those of the normative-based components. Another study conducted by...
Abrahamse et al. [10] suggested that TPB-based models perform better for car use than NAM-based models. In addition, an integrative review and research agenda by Steg and Vlek [11] suggested that the NAM-based models seem to have weak predictability power in high behavioural cost domains such as travel mode-choice behaviour.

Although a combined approach between the two types of models, which would be a solution to address the weakness of the pro-environmental model, has been pursued by numerous researchers [12–14], such an approach is probably not the only solution capable of improving the performance of the pro-environmental model. It should be noted that the existing pro-environmental models were generally discussed based on travellers’ mode-use obligations under a narrow background of environmental awareness. According to that model, researchers assumed travellers’ motivations (to use a specific transportation mode) simply originated from their awareness of environmental issues. This would probably lead to results showing no difference in mode-use obligation between private vehicles, which have environmental concerns, and public vehicles, which have both social and environmental concerns. Therefore, an expanded focus which covers either environmental concern or social concern, may help to improve the performance of pro-environmental models.

In addition, findings of non-mode-use studies have suggested that awareness of social value would likely be involved in deciding pro-environmental behaviour. Garling et al. [15] were in agreement with previous studies [16] that considered the involvement of pro-social-value orientation on pro-environmental behaviour. In a notion that social value implies benefits to society, pro-social-value orientation was referred to as a social dilemma in which individuals consider the payoff between acting in self-interest and acting in the interest of the collective. Their findings showed that social value orientation might modify the relationship between pro-environmental behaviour and awareness of environmental consequences. Similarly, Hansla et al. [17] focused on the relationship between awareness of consequences, environmental concerns, and value orientations. Their findings suggested that awareness of consequences for others (not only oneself) was involved in defining pro-environmental behaviour. As to the findings of the discussed studies, it is reasonable to hypothesize that social-awareness factors may play an important role in deciding travellers’ mode-use behaviour. Social-awareness defined in this study implies travellers’ awareness of social consequences (i.e., mode-use influences on society) and environmental consequences of travel-mode usage.

However, it was surprising that the literature on psychological studies showed few efforts aimed at the impacts of social-awareness factors on travellers’ mode-use behaviour. A possible explanation for this is that social-awareness related to transportation was considered to be a different concern. In particular, some previous studies provided findings related to the influence of public transportation on society, such as on the lives of elderly people. For example, Su and Bell [18] examined the travel behaviour of elderly people and found that the use of public transportation and walking increases when driving ability goes down. Similarly, Schmoker et al. [19] reported the dependence of elderly and disabled people on public transportation. In addition, aiming at changing travel behaviour, numerous studies of travel feedback programs (TFPs) conducted by Fujii and colleagues showed significant effects in reducing car use as well as increasing the use of public transport [20,21]. However, the TFPs focus on communicative measures to change travellers’ behaviour, thus losing its attention to the diversity of travellers’ social awareness which may improve the effectiveness of the TFPs.

Based on the above-mentioned arguments, under the view of the pro-environmental approach, the objective of this study is to provide an examination of the necessity of expanding travellers’ mode-use obligations towards social-awareness aspect by considering various social awareness factors in the mode-use model. Due to the social-awareness-seeking purpose of this study, the bus service setting was considered an appropriate context for the investigation. Social-awareness in the context of bus service can be understood as the awareness of all possible consequences and/or interactions of the service in society and environment. The fundamental argument leading to this definition is that environmental concerns are not the only aspect motivating travellers’ obligations to use bus service. There are several aspects that may influence travellers’ motivations, such as awareness of giving support to the elderly and/or a responsibility to contribute to the local community.

2. Literature review of mode-use behaviour’s determinants

This study applied the conventional approach for considering inclusion of unexplored factors into the mode-use model. This was done to examine the factors under the appearance of a set of widely known determinants. The involvement of these accepted determinants guarantees the independent existence of testing factors as new determinants. Therefore, the impacts of social-awareness factors on intention to use bus service were considered with the involvement of some key intention predictors. As for the notion that intention to use public transportation seems to be more related to the self-interest motive [15], predictors representing the self-interest motive of travellers regarding bus usage were selected for the investigation.

Satisfaction can be seen as a central construct for representing the cost-benefit essence of travellers. The role of satisfaction measures regarding public transportation service was important [22]. As noted by Wen et al. [23], satisfaction is an emotion, a degree of pleasure and contentment, and a distance between performance and expectations in service. The concept of satisfaction makes it close to service quality, thus it is able to capture the self-interest motive of travellers. In addition, because customer satisfaction was defined as a core part of customer affection [24], then it could be seen as an important part of personal attitudes towards the service [25].

The descriptive norm was found to have a significant influence on travellers’ behaviour. Inferring from the acquisition of perceived descriptive norms [26], the descriptive norm in the context of bus service can be viewed as people learning from community trends in bus service use and/or from others with whom they are acquainted with through their social network. A meta-analysis by Rivis and Sheeran [27] showed the strength of the descriptive norm-intention relationship with a medium to strong correlation. Another meta-analysis by Manning [28] conducted on 196 studies showed that the descriptive norm was stronger than the injunctive norm of behaviour in the TPB-based model. Regarding the domain of public transportation use, the role of the descriptive norm in bus use has been concretely considered by Health and Gifford [29]. The authors’ review work on social norms related to the TPB also showed that the descriptive norm could be a better alternative due to the frequently found weak relationship between the subjective norm and intention.

Perceived behavioural control (PBC) was recognized as one of the key components in the TPB. According to the theory, PBC implies people’s perception of the ease or difficulty of performing the behaviour of interest. In the mode-choice context, PBC seems to refer to perceived capacity, for example, the availability of facilities [30]. A meta-analysis by Armitage and Conner [31] found PBC to have a significant impact on intention and behaviour. Examining 185 studies that contained empirical tests of the TPB, the authors found that PBC significantly contributed to the variance of intention and behaviour. The moderating influence of PBC has also been examined by Castanier et al. [32].

Travellers’ habits regarding mode choice have been widely discussed by researchers. Although some studies showed successful results in integrating the construct into the mode-choice model [33,34], caution is still advised when considering the inclusion of the construct in the model. Ouellette and Wood [34] indicated that the strength of the attitude-intention relationship was different between habitual behaviour and non-habitual behaviour. In addition, habitual behaviour probably relates to misperception and selective attention, and thus should only be considered when the context changes significantly.
In addition, the impact of habit on mode-choice behaviour was sometimes out of the expected thought [30]. Notably, the findings of Kockler and Matthes [35] showed that travellers’ decisions seem to be more norm-based, motivated by weak habit. Therefore, with the goal of considering the impacts of social-awareness factors, which are of norm-based origin, this study did not include habit in the mode-choice model. However, all findings of this study were discussed with a full awareness of the habitual context.

3. Operationalization of social-awareness factors

Regarding the major concerns of this study, it should be noted that the social-awareness aspect of travellers was investigated through three latent variables. The first variable was travellers’ general understanding regarding the consequences of using bus service. This variable will be referred to later in this study as social-awareness of consequences. The second variable was travellers’ specific awareness regarding the consequences of using bus service in their area. This variable will be referred to later in the study as perceived service interruption. The difference between the first and the second variables was that the first variable represents general awareness of consequences, while the second variable represents specific awareness of consequences in which travellers have a connection between the bus service and the real situation of their area of residence. The final investigated variable was an unexplored variable with a focus on the interaction between the bus-service provider and travellers. The third variable was taken into account based on the argument that a positive image of a bus-service provider in social activities may encourage travellers to use bus service.

The first investigated variable, “awareness of consequence” (AC), was one of the key determinants of norm-based models. Identified in the pro-environmental approach, AC was seen as individuals’ belief about the impacts of transportation mode on the environment. Regarding mode-use studies, a focus on the role of AC in the norm-activation models has been published by various researchers [36,37]. However, AC has only been discussed in the context of the impact of transportation mode on the environment. As partly mentioned in previous sections, this study aims to examine the social-awareness of consequences (s-AC) regarding public transportation. The construct, therefore, was assumed to include both environmental and social consequences (e.g., support for the elderly).

The second variable, perceived service interruption (PSI), was a novel factor introduced in this study. In the context of bus service, PSI refers to travellers’ feelings about bus service suspension. The factor should be differentiated from perceived lack of facilities, commonly referred to PBC [30]. A fundamental basis for the debate on the existence of PSI was the assumption that travellers’ obligations to use bus service increase when their awareness of the service’s consequences was specified. PSI was expected to activate travellers’ imaginations on the impacts of bus service on their living environment and community. In particular, bus service interruption was assumed to lead travellers to specific thinking, for example, elderly neighbours that use bus service. Travellers’ obligations, in that case, are expected to be different from a case where they are content with a general awareness of bus service consequences.

To further argue the existence of PSI, the variable was assumed to take on the role of specific awareness of consequences, which is different from general awareness of consequences (i.e., s-AC). A discussion on the existence of general awareness of consequences and specific awareness of consequences has already been presented in a study conducted by Nordlund and Garvill [36]. Explaining the characteristics of PSI, it is argued that travellers consider both self-benefit and the benefit of people living nearby when they refer to the suspension of local bus service. It should be taken in to account that the existence of PSI would be only rational in the instance that travellers are aware of the availability of bus service in their area.

The last social-awareness factor investigated in this study originated from a practical issue of transportation management policy. Some governments have already decentralized bus service to private companies. The policy has added up to a trend that shows an important role of bus service providers in sustaining the service. As such, bus service providers with active media exposure may be good at attracting travellers to use bus service. This is in accordance with findings of using media exposure to influence people’s environmental concerns in the non-mode-choice domain [38,39]. Based on such an assumption, there would be reason to hypothesize that awareness of a social-dedicated effort by bus providers (to sustain bus service) may play an important role in encouraging people to become a bus user. This study, therefore, aims to examine how a bus service provider’s community-dedicated image influences citizens’ modal choice. As such, travellers’ recognition of bus service providers’ effort (RBE) was considered. The variable can be seen as an unexplored factor in the context of bus service.

4. Method

4.1. Data collection

A survey was conducted in Hidaka City, Saitama Prefecture, Japan, from September 25th, 2012, through October 5th, 2012. Located in a southern region of the prefecture, the city has an area of 47.5 km² with approximately 58,000 inhabitants (as of 2014). The average number of daily bus commuters was approximately 700 people, making the city ineligible for a subsidy from the Japanese government. Faced with non-commercial bus routes, the current bus service companies have made a significant effort to improve service, including annual surveys on citizens’ needs to keep bus service operating. The current bus service has approximately 17 main routes which cover most of the residential areas in Hidaka city. Travellers can use the bus service from 5:00 am to 22:30 pm daily with approximate 2 to 3 buses per hour in peak time and 1 bus per hour in off-peak time. Bus stops are located with an interval of approximate 300 m in residential areas.

Questionnaires were sent by post to randomly selected residences in order to reduce any bias toward to a certain traveller group, ensuring an accurate representation of bus usage in Hidaka City. Along with the 7500 questionnaire sets sent to respondents, a leaflet with additional information describing how bus usage contributes to environmental protection, quality of life for the elderly life as well as the efforts of the bus service provider to sustain bus service was added to half of the questionnaire sets. The number of returned questionnaires was 554 (7.39%). However, because of incomplete answers, only 333 (4.44%) questionnaires were used for further analyses. General characteristics of respondents are presented in Fig. 1. Of those who were involved in the survey, it should be noted that 48% and 52% are male and female, respectively (comparable to 49.9% male and 51.1% female as of statistics of 2014); 59.1% are below 65 years old (roughly comparable to 74.2% as of statistics of 2014); 82.3% live less than a perceived 5 min walk from their home; 75.9% have lived in the area for 10 years or more; and 77.2% have a driving license.

4.2. Measures

For the purposes of this study, the questionnaire included items designed to measure travellers’ perceptions of bus service, including satisfaction, the descriptive norm, PBC, s-AC, PSI, RBE and intention to use bus service. The items were aimed to capture the essence of the investigated constructs. Satisfaction was measured by one item that asked respondents about how satisfied they were with the bus service. Based on the notion that the descriptive norm reflects travellers’ awareness of others’ behaviour [40], adopted from previous studies, two items were designed to gauge how travellers perceive the trend
of bus usage in their area. Items designed for measuring PBC and intention to use bus service were adopted from the conventional TPB model. Inferred from the concept of awareness of consequences [8], social-awareness of consequences was understood as travellers’ perception of the consequential impacts of bus usage on the environment and society. Therefore, two items were designed to see how travellers perceive the impacts of bus usage on environmental protection and support for the elderly. The item for measuring environmental protection was adopted from Klockner & Friedrichsmeier [14]. Regarding the measure of PSI, there was no reference for its measurement because the variable was originally introduced in this study. According to the argument for the existence of the variable in the previous section, it was considered specific awareness of consequences of bus usage, which requires a specific perception on the impacts of bus service. Thus, in order to help respondents to specify the impacts, one item was designed to activate travellers’ imaginations about the interruption of bus service in their area. Similarly, measurement of RBE was conducted with a direct request to travellers to state their assessment of the bus service provider’s effort to sustain service. All of the items are shown in Table 1.

For each item, respondents were asked to select one answer on a Likert-type scale ranging from 1 (strongly agree) to 5 (strongly disagree). There were only two exceptions: the answer for PSI, with three options provided (1—I really want to keep the bus service, 2—Please keep the bus service if the bus service provider can, 3—The bus service provider can stop the service), and the answer for the question on RBEs, with a range from 1 (very good) to 5 (very bad). Although the use of three-option answer for measuring PSI is acceptable due to its ability to capture three basic levels of perception of respondents (i.e., positive–neutral–negative), a better design with more than three options is desired in future studies.

In addition, as already mentioned in the modelling approach, it should be noted that the purpose of measuring travellers’ habits in this study was not to include the variable in the model. Rather, it was to understand the habitual context of the empirical study. Therefore, travellers’ habits measured in this study were different when compared with conventional measures. Instead of measuring habit for a specific transportation mode (e.g., habit of bus use), the present habit measure captured travellers’ general habits around their frequent-use transportation mode.
Table 1
List of variables measured by the questionnaire survey.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Item/question</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>Q1. You are satisfied with the bus service</td>
<td>–</td>
</tr>
<tr>
<td>Descriptive norm</td>
<td>Q1. Number of people using bus service is currently increasing</td>
<td>.945</td>
</tr>
<tr>
<td></td>
<td>Q2. Most people you know currently tend to use bus service more</td>
<td></td>
</tr>
<tr>
<td>PBC</td>
<td>Q1. You find no difficulty in using bus service in daily life</td>
<td>.869</td>
</tr>
<tr>
<td></td>
<td>Q2. Using bus service is an easy thing for you to do</td>
<td></td>
</tr>
<tr>
<td>s-AC</td>
<td>Q1. Bus service is good for the environment</td>
<td>.566</td>
</tr>
<tr>
<td></td>
<td>Q2. Bus service is good for elderly people</td>
<td></td>
</tr>
<tr>
<td>PSI</td>
<td>Q1. If bus service near your house stopped, what would you think?</td>
<td>–</td>
</tr>
<tr>
<td>RBE</td>
<td>Q1. What do you think about the bus service provider's effort to sustain the service?</td>
<td>–</td>
</tr>
<tr>
<td>Habit</td>
<td>Q1. For you, changing from frequent-use mode to other modes is easy</td>
<td>–</td>
</tr>
<tr>
<td>Intention</td>
<td>Q1. Bus use is a priority for your daily travel</td>
<td>.940</td>
</tr>
<tr>
<td></td>
<td>Q2. You strongly intend to use bus service in daily life</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Q3. The possibility to daily use of bus service is high</td>
<td></td>
</tr>
</tbody>
</table>

PBC – Perceived Behavioural Control; s-AC – Social-awareness of Consequences; PSI – Perceived Service Interruption; RBE – Recognition of the Bus service provider’s Effort

5. Results

5.1. Descriptive analysis

Means, standard deviation, and Pearson correlations for the investigated variables are presented in Table 2. The average score of intention (3.160) showed that people have quite a low interest in travelling by bus. Intention to use bus service was significantly correlated with all of the investigated variables. The highest correlation coefficients were with PSI, PBC and the descriptive norm. The mean score of satisfaction of 2.500 suggested that travellers seem to be satisfied with the quality of bus service. A mean score of 2.553 for PBC indicated that people probably have a few difficulties in using bus service. An average score of 3.758 for the descriptive norm showed that travellers perceived a low trend of using the bus in their daily lives. In addition, the descriptive analysis regarding the score of s-AC showed a positive traveller perception of the impacts of bus usage on the environment and elderly people. People also showed a high desire to keep bus service operating with a positive mean score of PSI (1.879). Finally, the bus service provider’s effort to sustain bus service was positively recognized by travellers.

5.2. Regression on intention for bus use

Hierarchical multiple regression analyses were employed to examine the significant determinants of bus use intention. As to the traditional approach for a consideration of adding variables, conventional variables should be controlled when considering effect of new variables. Thus, there were five consequential steps conducted in the analyses. As seen in Table 3, the first step was to investigate the impacts of the selected demographic factors on intention of bus usage. The selected demographic variables included age, gender, time of residence, perceived distance to the nearest bus stop, number of cars owned, perceived travel time to the frequent-use train station by bus, and driving license. Among the seven variables entered in the model, there were three variables (age, perceived distance to bus stop and number of cars owned) with significant β-weights (β = −.137, p < 0.05; β = −.297, p < 0.001; and β = .200, p < 0.001, respectively). The demographic factors explained a statistically significant proportion of the variance in bus use intention (R² = .230, p < 0.001). The second step was the involvement of selected latent factors, including satisfaction, PBC and the descriptive norm. These latent factors accounted for a significant increase in the variance of bus use intention (R² = .508, R² change = .277, p < 0.001). As presented in Table 3, all of the latent factors had significant β-weights, which indicated that satisfaction, PBC and the descriptive norm were statistical predictors of intention of bus use. The regression model for the third step was conducted with a further inclusion of traveller’s s-AC regarding bus usage. The extended version of awareness of consequences (i.e., extended to capture travellers’ social-awareness) showed a significant improvement to the value of R-square (R² = .611, R² change = .066, p < 0.05). In the fourth step, a new variable (PSI) was added to the regression model. The results in Table 3 show that PSI was significantly associated with intention of bus use (β = .316, p < 0.001). The value of R-square changed significantly due to the addition of PSI (R² = .668, R² change = .057, p < 0.001). The involvement of PSI in this step eliminated s-AC and age as significant predictors of intention (respective values are β = −.026, p = .510; β = −.048, p = .219). The final step was to consider the addition of RBE. The RBE’s coefficients in the regression model implied an insignificant influence of RBE on intention of bus usage.

6. Discussion

The objective of this study was to provide an examination of the necessity of expanding travellers’ mode-use obligations towards social-awareness aspect by considering various social-awareness factors in the mode-use model. Various social-awareness factors were investigated, including social-awareness of consequences, perceived service interruption and recognition of the bus service provider’s effort. Of the investigated social-awareness variables, social-awareness of consequences and perceived service interruption were found to significantly

Table 2
Means, standard deviation, and correlations between investigated variables.

<table>
<thead>
<tr>
<th>No</th>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Satisfaction</td>
<td>2.500</td>
<td>1.094</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>PBC</td>
<td>2.553</td>
<td>1.238</td>
<td>.394*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Descriptive norm</td>
<td>3.758</td>
<td>1.071</td>
<td>.223*</td>
<td>.340**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>s-AC</td>
<td>1.717</td>
<td>.659</td>
<td>.315*</td>
<td>.478**</td>
<td>.324**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>PSI</td>
<td>1.879</td>
<td>.714</td>
<td>.324*</td>
<td>.560**</td>
<td>.358**</td>
<td>.469**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>RBE</td>
<td>2.205</td>
<td>.953</td>
<td>.471**</td>
<td>.263**</td>
<td>.277**</td>
<td>.407**</td>
<td>.235**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Intention</td>
<td>3.160</td>
<td>1.380</td>
<td>.416**</td>
<td>.653**</td>
<td>.508**</td>
<td>.459**</td>
<td>.677**</td>
<td>.310**</td>
<td>1</td>
</tr>
</tbody>
</table>

Measure scale: 1 (strongly agree)–5 (strongly disagree).

* p < 0.01; ** p < 0.001.
influence intention of bus usage. These variables were found to contribute, in total, 6.3% variation in travellers’ intention of bus use. Recognition of the bus service provider’s effort was not qualified to be a predictor of bus use intention. With two novel social-awareness factors found as predictors of travellers’ behaviour, this study has successfully contributed to the literature on determinants of travellers’ behaviour. Importantly, seeking to improve the performance of the pro-environmental model, this study successfully suggested a favour towards an extension of normative-based models, an extended version of the variable of the bus service provider’s effort.

The aim of consideration of social-awareness factors as determinants of travellers’ behaviour originated from poor performance of the pro-environmental model in predicting travellers’ behaviour. In contrast with the conventional pro-environmental model, which uses environmental obligation to explain travellers’ transportation mode use, this study argued that there is no difference between private vehicles, which have environmental concerns, and public vehicles, which have both social and environmental concerns. Thus, there should be a consideration of the social-awareness obligation in addition to the environmental obligation; however, this study did not aim to consider an extended version of the pro-environmental model. Rather, as an initial step, it examined the social-awareness origin of travellers’ motivations towards transportation mode use. As a consequence, three social-awareness factors were investigated, including social-awareness of consequences, perceived service interruption and recognition of the bus service provider’s effort.

Regarding awareness of consequences, one of the key variables of normative-based models, an extended version of the variable (i.e., social-awareness of consequences), was investigated. The measure of the variable was designed to capture both environmental concerns and concerns for the elderly. As for the results of the hierarchical multiple regression analyses, after controlling demographic variables and TPB-based variables, social-awareness of consequences was observed to significantly contribute to a 0.6% increase in the variance of intention of bus use. This indicated that the variable was a statistical predictor of bus use intention. The significance of the variable as a predictor of consequences on bus use intention suggested that the perception of the dependence of elderly people on bus service is likely involved in deciding travellers’ bus use intention.

As suggested by previous studies [36], both general awareness of consequences and specific awareness of consequences exist. However, literature on travel behaviour studies showed few efforts aimed at discussing the separate roles of the variables in the domain of mode-use behaviour. Regarding the bus service context, this study was the first attempt at considering the separate impacts of those variables on intention of bus usage. In contrast with general awareness of consequences of bus usage (i.e., social-awareness of consequences), PSI was defined to capture travellers’ specific awareness of consequences, reflecting the specific influence of bus service in a traveller’s area. The notion of a supposed service interruption was assumed to activate travellers’ specifications of the influence of bus service on their life and the life of their neighbours, leading to stronger traveller obligation to use the service. As theoretically expected, the results of the hierarchical multiple regression analyses showed an empirical support for the consideration of PSI as a predictor of bus use intention.

In the final model with the involvement of all investigated variables, PSI was the strongest determinant of bus use intention (PSI’s β-weight = .317). After controlling the demographic variables and the selected latent variables, PSI was observed to contribute to an increase of 5.7% in the variance of bus use intention. The influence of PSI should be put into the context that most of the respondents were aware of the availability of bus service in their area (82.3% of respondents have less than a 5 min walk to the nearest bus stop).

The social-awareness aspect of travellers was extensively examined with an investigation on the interaction between travellers and the bus service provider. The main reason to consider the influence of the interaction on bus use intention was that the active role of the bus service provider might create a community-dedicated image that motivates people to share the community-dedicated responsibility by using the bus service. The relationship between the interaction and travellers’ bus use intention was considered with an examination on the influence of a variable, abbreviated RBE, on bus use intention. Although respondents showed a positive perception of the bus service provider’s effort in sustaining the bus service (mean value = 1.717), RBE was not qualified to be a predictor of bus use intention. A possible reason to explain the insignificant influence was that travellers might...
assume the bus service provider’s effort originated from a beneficial motive rather than from a community-dedicated motive. Thus, an orientation on building a community-dedicated image for the bus service provider may be necessary for better influence of the interaction on intention of bus usage. This could be a potential issue for future works.

This study provided additional support on the important roles of some conventional variables, including satisfaction, PBC and the descriptive norm, as predictors of bus use intention. The results from the hierarchical multiple regression analyses showed that these variables significantly accounted for a 37.5% increase in the variance of bus use intention after controlling all of the demographic variables. The influences of these variables remained significant in all of the regression models. Among the variables, PBC was observed to have the strongest influence on intention of bus usage (PBS’s $\beta$-weight = .297 in the final model). It should be noted that the bus service was available to most of the respondents (82.3% of respondents have less than 5 min walk to the nearest bus stop). Thus, perceived lack of facility was likely not the main cause for the establishment of travellers’ PBC. There might have been other causes that contributed to the strength of travellers’ PBC. In addition, the descriptive norm was observed to be an important factor in bus use intention. The influence strength of the descriptive norm was higher than that of satisfaction in deciding bus use intention (descriptive norm $\beta$-weight = .220 versus satisfaction’s $\beta$-weight = .098 in the final model). This might reflect the fact that Japanese travellers put a stronger weight on others’ travel mode choice than their own in deciding their bus use intention.

In addition, several demographic variables were observed to be determinants of bus use intention. The final multiple regression model showed that time of residence, perceived distance to bus stop, and number of cars owned were predictors of bus use intention. A longer time of residence, perceived distance to bus stop, and a higher number of cars owned related to a weaker intention of bus use among residents living in apartments that are generally far from bus stops, might intend to use bus more than travellers living in resident houses that are generally near bus stops.

7. Conclusions

In aiming to discuss travellers’ transportation mode-use motives with the involvement of the social-awareness aspect, this study was the first attempt at providing an examination of the necessity of expanding travellers’ mode-use obligations towards social-awareness aspect by considering various social awareness factors in the mode-use model. Various types of travellers’ social-awareness were examined in the context of bus service. Among the investigated social-awareness variables, two out of three were observed to be predictors of bus use intention, giving support to the extension of travellers’ mode-use obligations. After controlling demographic and TPB-based variables, these variables contributed to 63% (0.6% for social-awareness of consequences and 5.7% for perceived service interruption) of variation of travellers’ bus usage behaviour. The stronger impact of perceived service interruption, which acts as specific awareness of consequences compared with that of social-awareness of consequences, which acts as general awareness of consequences might indicate that travellers base decisions on intention to use bus service greater on mode-use consequences when it is clearly specified.

References


