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An Exploratory Study of the Functional and Intangible Factors in Decisions to Use Service Areas Attached to Motorways

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Abstract:

The purpose of this study is to model the decision-making of users of service areas (SAs) attached to expressways in Fukui Prefecture and to propose a useful scale for understanding actual usage. The data used in the analysis are the results of a questionnaire survey conducted jointly by Central Nippon Expressway Company Limited (NEXCO Central Japan) and the University of Fukui on users from October 2021 to March 2022. NEXCO Central Japan is a company that manages and operates motorways and expressways in Central Japan. Resting facilities on motorways are often referred to as SAs, and many are operated by the NEXCO Central Japan corporate group.

Keywords:

functional; intangible factors; motorways

I. Introduction

The Nanjo SA in Minami-Echizen-cho, Fukui Prefecture, is located on the Hokuriku Expressway. It is one of the most popular rest facilities for both users within the prefecture and tourists from outside the prefecture. This survey was conducted on users of the Nanjo SA. The survey used an exploratory method. It was not based specifically on hypothesis-testing but rather used an approach that aimed to capture the decision-making processes of users by hypothetically designing a model (or scale) that fit the data and analysing the implications of the model. The obtained models were judged to be reliable in light of their high degree of fit and the explanatory power of the data, and they were also capable of presenting logical practical suggestions. The following sections provide an overview of this exploratory study, a critical evaluation of the analytical results, and plans for a future refined version of this study.

II. Review of Literature

2.1 Motorway Service Stations and User Perceptions

Matsushita et al. (2011) conducted a survey of rest facility users' attitudes and analysed their use of rest facilities, the timing of their choice of rest facilities, and the reasons for their choices. It was found that 46% of respondents decided on a rest facility at the last minute, and 38% planned their decision in advance. This means that more than half of the users decided to

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rest on a case-by-case basis according to the timing that appealed to them, indicating it may be essential to appeal to users' psychological attachments to increase repeat use. Matsushita et al.'s empirical study also revealed that the purpose of rest facility use differed depending on the timing of the decision to use the facility. Additionally, it was asserted that the attractive attributes of rest facilities are key selection factors.

According to Nakao et al. (2018), a landscape research perspective is useful in examining the promotion of SA use. Through empirical experiments, Nakao et al. demonstrated that reflecting on the design concept and successfully integrating it into communication with users can stimulate the desire to visit an SA. Their analysis also shows that a design philosophy based on entertaining users and increasing the attractiveness of the interior space through careful construction can inspire use of an area.

Mayahara et al. (2017) investigated resting behaviour in highway SAs among elderly people and families with children. Based on behavioural observations, they compared functional facility use behaviours, such as using the toilet, eating and moving around, which are regarded as core elements of conventional SAs and are maintained in accordance with building standards and other policy systems (hereafter referred to as functional behaviours), with behaviours that users perform of their own free will (hereafter referred to as free behaviours). The results indicated that functional behaviours, such as toileting, eating and transportation, and free behaviours, such as shopping, passing time and relaxation, are the two pillars that define SA users' behaviour. They also indicated the effectiveness of using these two pillars as a scale for analysing users' behaviour. The scale developed by Mayahara et al. (2017) should be evaluated as an effective guideline for practical and effective SA research.

2.2 Diversity of Measures of Quality and Function of SAs

Originally, highways traversing the narrow Japanese landmass supported Japan's post-war economic development. In developed countries with declining birth-rates and aging populations, ensuring and expanding mobility for citizens has always been an important issue of national policy (Kii et al., 2021). Since then, public sector road maintenance has progressed in response to the demands of the times, including the introduction of private sector vitality. In the case of NEXCO Central Japan, the research target of this study, it provides services to users of private-sector methods that incorporate efficiency and market principles (Chen et al., 2021).

Although the main focus of this study is not to deepen the debate on privatisation or deregulation, it is important for road operators to gain the support of users, provide quality services and increase customer repeat business (Shaaban et al. 2021). The two above-mentioned dimensions SA functions suggest the development of a "theme park"-type SA, where users can enjoy not only functional behaviour but also freedom of movement or, more specifically, the freedom to have fun. This new perspective poses challenges for road administrations and public service providers (Rinva, 2022).

2.3 Research Question and Analytical Framework

The purpose of this study is to generate suggestions from the model exploratively drafted from quantitative data to obtain an in-depth view of the theme of the study and critically examine the relationship between the research questions and each factor leading to the investigation. To this end, a behavioural decision model of SA users was examined by deciphering the relationship between latent factors and intention to use, which encompass the observed variables prepared around the two functions of SAs mentioned above.

exploratory discussion bridges the gap between theory and practice and provides preliminary preparation for the next research step.

III. Research Methods

3.1 Survey Design and Data Collection

Of the several SAs managed by NEXCO in Fukui Prefecture, Nanjo SA was selected as the survey target, and a questionnaire was administered to its users. These face-to-face surveys were conducted at Nanjo SA along the expressway from December 2021 to January 2022 by faculty and graduate students affiliated with the author team's laboratory. The survey was conducted following semi-structured interview items covering scales prepared based on previous literature. The questionnaire was printed on A4-sized paper and consisted of four pages. The interviewers approached SA rest area visitors at random and recorded their responses through interviews, which took approximately 5 to 10 minutes each. While collecting the data, each respondent was informed of the details of his or her participation in the survey, with permission having been granted by the University of Fukui's ethics committee. We explained that all the data from the responses would be anonymised and used for academic purposes only, and only those who gave their consent were administered the survey. Table 1 outlines the interview guide.

Table 1. Questionnaire items

1. Basic information about the respondent	Age Gender Purpose of travel County of residence Companion(s) Smoking or non-smoking
2. Facilities in and adjacent to the rest area	Are you familiar with the adjacent facilities? Which of the two facilities did you come for (facilities in the area/adjacent facilities)? The order in which the two facilities were visited Where did you park your car in the car park? The length of time spent at each facility
3. The souvenir shops and restaurants located in the rest area	・Amount and type of money spent in rest area facilities ・14 Likert-type questions about the facilities in the rest area. (disagree/not really agree/somewhat agree/agree/not used) 1. Good location, easy to get to 2. Good selection of goods at the shops 3. Good selection at the food court (restaurants) 4. Toilets are clean and easy to use. 5. No problems with the number and location of toilets (adequate) 6. No problems with the number and location of parking spaces (adequate) 7. No problems with opening hours (adequate) 8. Used for the purpose of taking a break 9. Used for shopping purposes. 10. The food court is attractive. 11. The shops are attractive.

	12. Satisfied with the tourist information centre 13. Would like to visit again' 14. Overall, I am satisfied.
4. Souvenir shops and restaurants adjacent to rest areas	・Amount and type of money spent at facilities adjacent to rest areas ・14 Likert-type questions (same as 3) on facilities adjacent to rest areas

3.2 Data Analysis

In addition to basic tabulations, including the basic demographics of the respondents, the responses obtained from Likert-scale questions were used for the analysis. To identify the factors that led to repeat behaviour among visitors to SAs, we attempted to explicitly identify causal relationships through structural equation modelling (SEM).

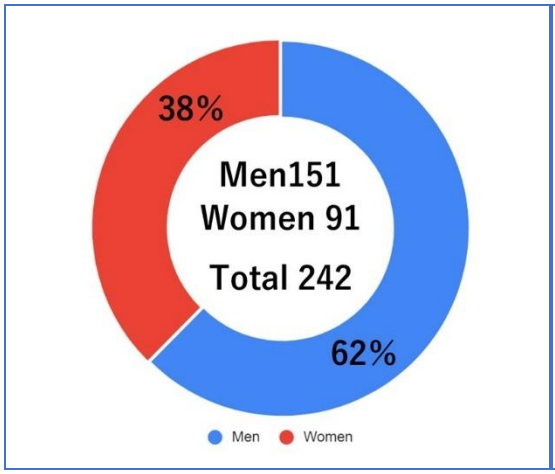
Assuming the prepared observed variables as antecedents, multiple SEMs were developed, and the best model was adopted as the main exploratory model for this study by determining the goodness of fit and logic of the model. Furthermore, the discussion focused on the relationships between the variables, the statistical significance and weight of the path coefficients and the antecedents that define intention to use.

IV. Discussion

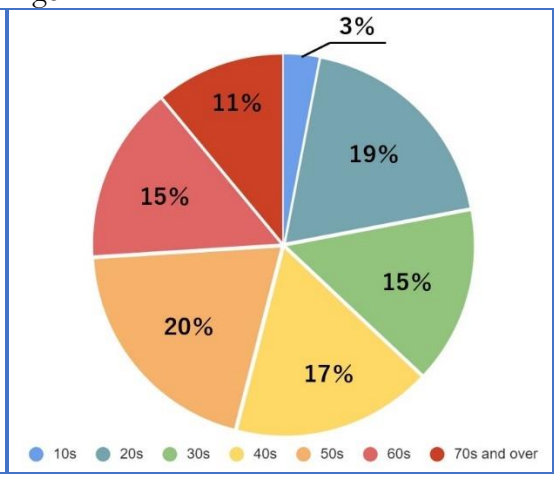
4.1 Data Profile

There were 243 respondents, whose basic demographic attributes are shown in Figure 1.

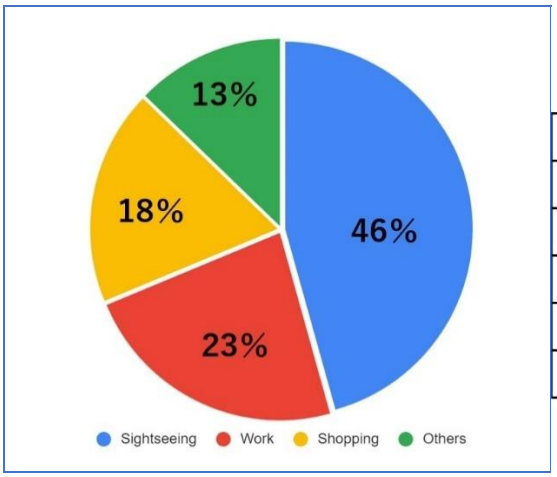
Gender



Age



Purpose for visiting the SA

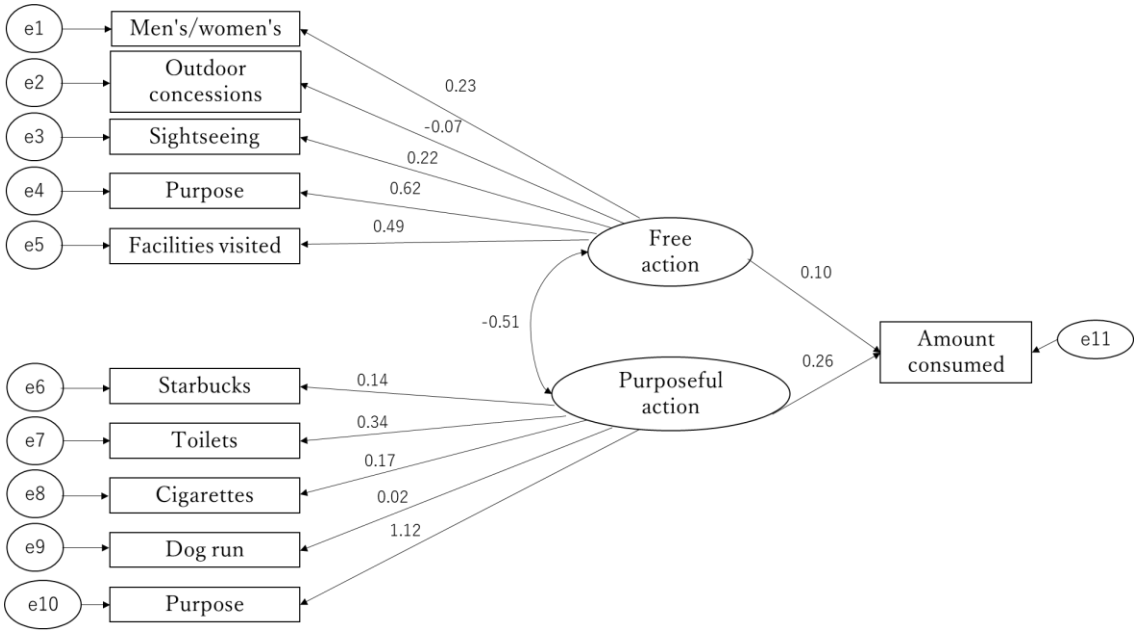


	Weekday	Holiday	Total
Sightseeing	45	66	111
Work	50	6	56
Shopping	21	24	45
Others	17	14	31
Total	133	110	243

Figure 1. Data on Respondent Profiles

4.2 Model Development

The results were deciphered by constructing an SEM based on five observed variables, each comprising two latent elements of the two pillars that were scrutinised in the literature review (in this case, free behaviour and functional behaviour). As shown in Figure 2, the goodness of fit of the model was satisfactory at 0.944, and the purchasing behaviour in SA of each of the two elements (substituted by the amount spent) significantly influenced the results of the model. Interestingly, it was found that the routine objective behaviour, i.e. the fulfilment of functional needs, stimulated purchasing behaviour more than free behaviour. At the same time, among the components of free behaviour, the tendency to visit "for fun" had the greatest impact.



GFI:0.944 AGFI:0.911 SRMR:0.0653

Figure 2. *SEM Results*

The path coefficients obtained are shown in Figure 2, and their significance levels are shown in Table 2. The results highlight that among the five observed variables comprising the functional behaviour component, reasons such as restroom use, smoking and eating/drinking had significant impacts, while the five observed variables comprising the free behaviour component indicated that visiting was viewed as an end in itself, as described above.

Table 2. Path coefficients for path diagram

Path name			Path coefficient
Starbucks	<---	Purposeful action	.142
Toilets	<---	Purposeful action	.340
Cigarettes	<---	Purposeful action	.170
Purpose	<---	Purposeful action	1.057
Amount consumed	<---	Purposeful action	.258
Amount consumed	<---	Free action	.104
Facilities visited	<---	Free action	.489
Purpose	<---	Free action	.624
Sightseeing	<---	Free action	.217
Dog run	<---	Purposeful action	.024
Men's/women's	<---	Free action	.228
Outdoor concessions	<---	Free action	–.067

*All paths represented significant relationships ($p < 0.05$)

4.3 Discussion

Based on the results of the above SEM, an analysis of the classification of customer behaviour into functional and free behaviour and how each affects the amount of spending was performed to provide useful data for improving SA services and attracting more customers in future. As shown in Figure 1, (I) free behaviour and functional behaviour were both positively correlated with the amount spent in the SA. In addition, (ii) functional behaviour had a stronger positive causal relationship with the amount spent in the SA. Other findings included that (iii) free behaviour had a negative causal relationship with outdoor stores, which were therefore used less often; (iv) visitors for tourism purposes were engaged in free behaviour, and many of them were women; (v) functional behaviour in the SA was correlated with a strong purpose-consciousness, resulting from menstrual behaviour and the use of tobacco, coffee (Starbucks) or other luxury goods; and (vi) based on the coefficients among the functional behaviour, restroom use had a significant impact.

Overall, it should be noted that there was a negative causal relationship between free behaviour and functional behaviour. To further increase the amount of money spent at rest facilities, it will be necessary to induce functional behaviour. This can be done in two ways: by further strengthening the sense of purpose inspired by rest facilities and/or by further promoting the existing functions. Particular attention should be paid to how physiological needs affect the amount of spending as restroom use has a significant influence.

In addition, since the latent variable of physiological need had a strong positive causal relationship with visual information and convenience, as demonstrated by the responses to the statement "restrooms are clean and easy to use," it can be considered important to enhance the convenience of restrooms through visual means.

V. Conclusion

5.1 Contribution

This study collected data from users of SAs, formulated a hypothetical model in an exploratory manner using the results of a data analysis and then determined the implications of the model to propose an agenda for a subsequent round of refined research. The model and measures proposed by this study should be used in the future to extract further concrete suggestions after a careful examination of balanced and large-scale data.

5.2 Limitations and Further Research Opportunities

For exploratory purposes, this study used data collected by random methods, mainly by university faculty members and graduate seminar members among the author team, with priority given to convenience. In the future, we aim to improve the quality of the analysis results to the level of specific recommendations to SA management companies and the public sector through measures taken to eliminate bias in data acquisition (e.g. the consideration of weekdays, holidays and time of day), the validation of observation variables and a comparative study of multiple SAs.

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