ACCESSIBILITY AND ATTRACTIVENESS FOR PUBLIC PARK UTILIZATION: A CASE STUDY OF SAGA, JAPAN

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ABSTRACT: One of the important elements to consider in improving the quality of life in the communities is the available of green spaces. Public parks have been accepted as one of the most representatives of green spaces which recently have been given much attention as one of the indicator of urban quality of life. This study aims to contribute the development of methodological approaches to evaluate public park service in Saga city based on public opinion. To reflect the community point of view, a multinomial logit model based on maximum likelihood estimation is employed for this study to interrelate public preferences on public park utilization. Based on this approach, the method enables us to put forward a number of basic principles and to guide the development of public park service to improve accessibility and attractiveness. The accessibility can be investigated in term of the opportunities of usage that can be perceived by citizens as contribution to their quality of life. It can be seen that the availability of this kind of public space affect resident's patterns of activities, the modes and frequencies of utilization. Not only the location of public park within and outside residential district are perceived in different way but the respondents' personal characteristics, such as age, income, education and past experience of using public park service also result to the different patterns of public park utilization. The uniqueness of this model is that it focuses on the linkages between the availability of public parks and social needs. This is very useful information to guide local planning agency to locate suitable plan for current and future policy for public park service improvement and to enhance the quality of life of the community.

INTRODUCTION

The growth of the urban populations and associated industrialization has resulted in a range of detrimental and often dehumanizing outcomes (Woolley 2003). As a result from such a development, many impacts have been arising, especially on quality of the urban environment has been affected on a wide range of elements of daily life including housing, education, health, crime, employment and leisure, both for individuals and communities. One aspect of the urban environment that plays important role in daily life for people who live in urban area are public parks since they provide many different benefits and opportunities to people's everyday urban lives. Therefore, public parks have been recently given much attention as one of the indicator of urban quality of life since public parks provide opportunities to people for certain activities, while the individual can gain direct benefit from park utilization that are related to physical health as well as improved mental. In the same time, public parks also contribute indirect benefits to the community in term of social, economic and environmental.

However, in different country, the essential of public parks are considered in different level as well as the importance role of parks lie in different affected factors that are vary among individual country. Saga city is selected to be investigated as a case study for developed country on the interconnection between environmental and people's behavior on park utilization since public parks play more vital role in this country than developing country. To reflect the community point of view, this study employed a multinomial logit model based on maximum likelihood estimation to interrelate public preferences on public park utilization in this city. The selected three parks are performed on site interview survey for gathering the data collection that consists of, Saga castle park, Kono park and Shinrin park. Different parks provide different opportunities on activities along with the different groups of people formed different behavior and preference on park utilization. Based on this approach, it can be seen that the availability of this kind of public space affect resident's patterns of activities, the modes and frequencies of utilization. Not only the location of public park within and outside residential district are perceived in different way but the respondents' personal characteristics, such as age, income, education and past experience of using public park service also result to the different patterns of public park utilization. This is very useful information to guide local planning agency to locate suitable plan for current and future policy for public park service improvement and to enhance the quality of life of the community.

The structure of this paper is organized as follows. First, the employed method for assess the public park utilization is presented and the relevant literature is reviewed in the next section. Subsequently, a number of basic principles and assumptions to guide the development of model to capture the behavior and preference of park users are given details. Following that, the main concepts are applied in the methodology and illustrated in this section. Then, the analysis section is shown the result of investigation by using the data that collected in the study area. Finally, the conclusion of this study is summarized and discussed for future research.

LITERATURE REVIEW

As the increasing demand for recreation brought with in its own

pressures, such as congestion and potential environmental impacts, it is necessary to investigate the opportunity of usage and quality park service since it is importance to the formulation of policies for tackling deficiencies (Herzele and Wiedemann 2003). While there has been considerable work in the recreational activity analysis in the past, Bhat and Gossen (2004) mentioned that there are certain areas within this field that have been received lesser attention than others. However, some researchers have been attempt to determine value the quality or quantities of recreational service on economic values. Consequently, the microeconomic theory has played an important role in the application of modeling all of the individual's activities by linking choice occasions together to allow patterns in behavior to be reflected, and more generally, handling dynamic aspects of decision making over time (Hanley et al. 2003). Hearne and Salinas (2002) applied consumer theory by using random utility theory to understand and incorporate tourist preferences for nature appreciation, infrastructure, use restrictions and other attributes of nation parks and protected areas by imply recreational service as a purchased good that the utility value can be derived over a bundle of attributes or characteristics of a purchased good or service as well as users' characteristics. Thus, in order to strengthen the weak position of public parks in the context of current planning, the assessment of users' behavior and preference can be utilized to identify trends and directions to improve the quality of public park service for saga city.

CONCEPTS AND DEFINITIONS

This study employed a promising statistical technique that is multinomial logistic model to capture park users' behaviors in Saga city that are engaged in the personal characteristic, users' preference and park attractiveness. It is essential to identify this kind of statistical method that was applied to predict the likelihood of a categorical outcome of park destination selection. This technique has also proven as a powerful tool for estimate the value of service in term of utility. Iamtrakul (2003) applied the random utility model to determine the utility that users obtain from traveling to park on the shortest path from their residential location. Consequently, in order to reach to ultimate aim of this study, the concepts of the methods to estimate the recreation service value needs to be introduced as follows:

- Revealed preference approach

This approach is based on the actual behavior that the users performed during park visitation. In order to consume recreation service, park users have to travel to consume the service, therefore, the travel behavior and the activity behavior were tracing out to estimate utility for such sites.

- Utility measure

The indirect utility function for each user i (U_i) can be decomposed into two parts: a deterministic element (V), which is typically specified as a linear index of the attributes (X) of the j different alternatives in the destination choice set. and a random part of each users (e), which represents unobservable influences on individual choice (Ben-Akiva

1985):

$$U_{in} = V_{in}(X_{ij}) + e_{in} \qquad (1)$$

The probability that particular users prefers park p in the destination choice set to any alternative option q, can be expressed as the probability that the utility associated with option p greater than that associated with all other park options:

$$P[(U_{ip} > U_{iq})] = P[(V_{ip} - V_{iq}) > (e_{iq} - e_{ip})] \qquad (2)$$

In order to determine an explicit expression for the value of probability, the distribution of the error terms is necessary to defined. The typical assumption is that they are independently and identically distributed with an extreme value (Weibull) distribution, which implies that the probability of any particular alternative p being chosen as the most preferred can be expressed in terms of the logistic distribution. Hanley et al. (2003) stated that the relative probabilities of two options being selected are unaffected by the introduction or removal of other alternatives, and follows the independence from irrelevant alternatives' (IIA) property.

METHODOLOGY

Instrument

An on-site interview survey is selected to assess the users' behavior on park utilization in saga city. To ensure that the users are the target group, the interviewers were assigned to request the information of user on that particular visited site. A multiple-choice response format of questionnaire sheets were provided with specific answers form that was simple designed to clarity the ambiguous answers. Participants then were asked to response three set of questions that are activity characteristic, site attractiveness characteristics and personal socioeconomic and demographic information.

Procedure

Interviews were conducted by undergraduate and graduate students in the social system management program at Saga University. Each interviewer was given training about the interview procedures, the meaning of each question in the questionnaire sheets, and the description of each question. Each interviewer interviewed approximately 15 person per day. As a consequence, interviewers were instructed to conduct approximately equal numbers of interviews in each of the three area/time strata. Furthermore, the survey was conducted in both weekend and weekday.

Study area

Saga Prefecture is located in the northwestern part of Kyushu. It is surrounded by Fukuoka Prefecture to the east, Nagasaki Prefecture to the west, the Genkai Sea to the north, and the Ariake Sea to the south. Superhighways pass within the borders of this prefecture, making it an important part of Kyushu's transportation network. Saga covers an area of about 2,400 square kilometers, and the population is equal to 886,000 people. This study focused on three location of parks that are Saga castle

park, Kono park and Shinrin park that served the community in the different functions as depicted in figure 1.

Sample

A total of 289 useful questionnaires were obtained from interview on site in three parks as depicted in figure 2. In order to avoid redundancy, there is no repetition on the same respondents. It was carried out during the park users' visitation and each survey took about 15 minutes.

CASE STUDY

benefit for community focus, cultural focus and educational opportunities, the available of museum, library and historical place such as Saga castle play a vital role to attract more people to visit when compare to other places.

Table 2 Weekend and weekday on park utilization in Saga City

			Day of visit		
			Weekend	Weekday	Total
Choice model for park selection	Shinrin park	Count	43	53	96
		% within Choice model for park selection	44.8%	55.2%	100.0%
		% within Day of visit	38.1%	30.1%	33.2%
		% of Total	14.9%	18.3%	33.2%
	Saga castle park	Count	19	77	96
		% within Choice model for park selection	19.8%	80.2%	100.0%
		% within Day of visit	16.8%	43.8%	33.2%
		% of Total	6.6%	26.6%	33.2%
	Kono park	Count	51	46	97
		% within Choice model for park selection	52.6%	47.4%	100.0%
		% within Day of visit	45.1%	26.1%	33.6%
		% of Total	17.6%	15.9%	33.6%
Total		Count	113	176	289
		% within Choice model for park selection	39.1%	60.9%	100.0%
		% within Day of visit	100.0%	100.0%	100.0%
		% of Total	39.1%	60.9%	100.0%

On the other hand, during the weekend Kono park is the most preferable to users among three parks that can be noticeable by the highest percentage for weekend visitation. Since this park is the representative of passive recreation park that users can enjoy passive activities at park such as watching children or others or animals, looking at views, reading, resting or meeting friends. Kono park also has a playground, amusement park facilities for children, and a zoo. In addition, the uniqueness of this park is noted for its cherry trees. According to these attractions, this park becomes popular recreation spot for the people of Saga City. Considering park utilization for Shinrin park, the percentage of particular users during weekday and weekday are not much different. This might be due to the reason that this park serves mainly for active recreational activities that is usually taken to mean activities such as running and jogging, cycling, walking, skateboarding and playing other sports. This park provides many facilities to facilitate for a wide range of active activities such as children's playground, play field, running and jogging trail that may be undertaken by individuals or in familial or friendship groups. Additionally, the prefecture baseball park was built here since 1999.

Gender of park users

Gender is one of the independent variable that is expected to be regressed to determine their relative usefulness in accounting for the variance in the dependent variables (e.g., park location selection). Among 289, more than half of the users who visit park were female means there is the tendency that female get pleasure from recreational trip than male do. Furthermore, female prefer more passive and active activities while utilize park than male experience. This might be from the fact that many females would undertake the passive activity of watching their children play while socializing themselves. Thus, there is the

possibility that gender differences might account for variance in outcome measures.

Table 3 Gender of park users

			Gender of visitor		
			Male	Female	Total
Choice model for park selection	Shinrin park	Count	38	58	96
		% within Choice model for park selection	39.6%	60.4%	100.0%
		% within Gender of visitor	28.8%	36.9%	33.2%
		% of Total	13.1%	20.1%	33.2%
	Saga castle park	Count	54	42	96
		% within Choice model for park selection	56.3%	43.8%	100.0%
		% within Gender of visitor	40.9%	26.8%	33.2%
		% of Total	18.7%	14.5%	33.2%
	Kono park	Count	40	57	97
		% within Choice model for park selection	41.2%	58.8%	100.0%
		% within Gender of visitor	30.3%	36.3%	33.6%
		% of Total	13.8%	19.7%	33.6%
Total		Count	132	157	289
		% within Choice model for park selection	45.7%	54.3%	100.0%
		% within Gender of visitor	100.0%	100.0%	100.0%
		% of Total	45.7%	54.3%	100.0%

Age of park users

This personal variable varies from 10 to 60 years of age that can be classified into seven age groups. As can be seen from figure 3 that majority of users who visit Shinrin park are young users with ages ranging from 21-30 year. This may due to the fact that this users group can be affordable to travel there not only respect to the proper physical health but also the transportation means to travel there. Along with the attractiveness of this park related to their interest, young people take part in sport and recreation to improve their physical fitness and sense of well-being. On the other hand, most of adult group with ages ranging more than 60 years old prefer passive activity and value parks as places to be in, meet in, or "hang out" in. Since most of them are retired or inoccupation and they can take park utilization opportunities to increase the sense of community, socializing and educational opportunity. Consequently, Kono park and Saga castle park are desirable selected among them not only for relaxation and recreation for themselves but also for other purposes.
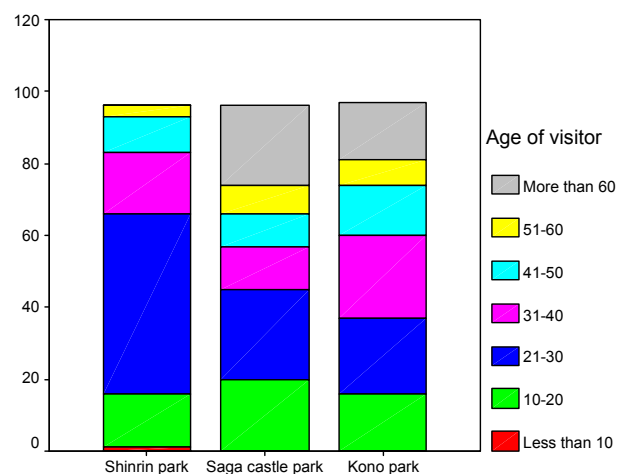

Figure 3 Age distribution of park users

The multinomial logistic regression model

Logistic regression is well suited for describing and testing hypotheses about relationships between a categorical dependent variable and one or more categorical or continuous explanatory variables. Specifically, multinomial logistic regression was well suit to be selected to answer the research question for two reasons. First, multinomial logistic regression provides an effective and reliable way to obtain the estimated probability of park utilization among three choice locations in Saga city. Second, the estimation can be drawn the relationship between independent variable and dependent variables that is useful information for park users' behavior analysis. As well as the number of users on each site can be approximated that is practical information for future research on park planning and management in Saga city.

The form of the multinomial logistic regression model involves on categorical dependent variable Y and other explanatory variable, X. Let P_1 = the probability of users select Shinrin park, P_2 = the probability of users select Saga Castle park, and P_3 = the probability of users select Kono park. The simplistic multinomial logistic regression model relates the log of odds (or logit) of Y to the explanatory variable, X, in a linear form, as follows:

$$Logit(P_i) = natural \log(odds) = \ln \qquad (3)$$

The predictor, X, can be categorical or continuous while the outcome (Y) is always categorical. The parameters are typically estimated by the maximum likelihood (ML) that is corresponding to the relationship between X and logits of Y. By using this statistics method, the null hypothesis states that all parameters equate to zero in the population. The rejection of such a null hypothesis implies that a linear relationship exists between X and the logit of Y.

RESULTS

After perform this kind of statistical analysis, the behavior of park users in Saga city can be functioned. The functional relationship of direct estimate of the probabilities of park selection can be illustrated as shown by the following:

Table 4 Multinomial logit model for park utilization in Saga city

	Independent variable	Extimated coefficient	Std. Error	Wald
Shinrin park	Intercept	-0.38	0.922	0.002
	Age	-0.059	0.014	18.629
	Day of visit	-0.227	0.331	0.47
	Walking	-2.423	0.665	13.268
	Bicycle	-1.735	0.422	16.922
	Security at site	0.673	0.215	9.786
Saga castle park	Intercept	-1.041	0.846	1.516
	Age	-0.005	0.011	0.215
	Day of visit	-1.532	0.342	20.043
	Walking	1.502	0.418	12.915
	Bicycle	1.406	0.393	12.785
	Security at site	0.196	0.196	0.995

The overall model evaluation such as the likelihood ration, wald tests, etc. were examined to determine the improvement of the model over the null model. All three tests provide good results that the model can be used to explain park users' behavior better than null model. The goodness of fit statistics can be presented as follows:

Table 5 Goodness of fit statistics

Independent variables	-2 log likelihood of reduced model	Chi square	Sig
Intercept	300.430	0.000	
Age	323.543	23.113	0.000
Day	323.229	22.800	0.000
Mode	391.227	90.797	0.000
Security at site	310.998	10.568	0.005
-2[L(0)-L(β)]	147.691		
Pseudo R-Square	Cox and Snell = 0.4 Nagelkerke = 0.45 McFadden = 0.233		
Percent correctly predicted	65.4%		

The results indicate that several types of variables affect the behavior of park users on the consumption of recreational service that each variable represents different determinants on participation of users' decision. The site selection is motivated by 4 major types of variables that include (a) occasional variable (Weekend/Weekday), (b) individual sociodemographic (Age), (c) attractiveness of park (Attitude and perception on security/safety inside park) and (d) accessibility of park (Modal usage). According to the analysis based on this approach, this study investigated the mentioned factors that contributed to the park users' behavior by each category, they are as follows:

Occasional variable (Weekend = 1/Weekday = 0)

Regarding the variation of the weekday and weekend, it is clearly reviewed from negative sign (-0.227 and -1.532) of both Shinrin park and Saga castle park that users tends to be mainly related to passive activity during weekend at Kono park. However, the pattern of park usage throughout the days of week can be also indicated by other individual specific factors.

Individual sociodemographics and characteristics (Age)

Considering that there are variations in ages of park users, as it is expected the adults will be predominated with passive activities such as walking, looking, and reading. The coefficients of age variable are -0.059 and -0.005 for Shinrin and Saga castle park, respectively. The ages users' group prefers to participate in many different passive activities to socializing themselves and provide opportunities for social identity and inclusion at community or cultural events. Therefore, the age coefficient for Saga castle park is greater than Shinrin park since many of adults can take opportunities for park visitation as a place for meet each others, both formally and informally. In addition, the available of historical place as

Saga castle can provide a sense of civic pride to the elder as well as the social or horticultural value an individual or community places attributes to that place.

Attractiveness of park (Attitude and perception on security/safety inside park)

In this study, the attractiveness of park site is represented by the score of level of security and safety inside park. Due to the positive sign of coefficients (0.673 and 0.196), it can be interpreted that the higher value on the security and safety for both Shinrin park and Saga castle park, the more attraction on number of visitors. However, the young users group has more awareness and concern about safety on site than older groups that can be observed from the difference in magnitude of coefficient of both park models. This may come from the fact that young people have more possibility to encounter to crime than elders. The enhancement on safety and security at park site not only provide direct benefit to park users but it is also one of the key indicator to attract more users to that site.

Accessibility of park (Modal usage)

Due to the reason that park is one of public good that users need to travel to consume the service, therefore the magnitude of this variable is more significant than others. The mode selection for traveling to park depends on destination selection. It can be seen that users who visit Shinrin park more prefer to drive car than other modes due to the negative sign (-2.423 and -1.735) on walking and bicycle variables in this mode. On the other hand, users will generally select walking mode or ride bicycle to Saga castle park since the location of this park can be more accessible to residents than other places. The sign of parameter estimation are both positive sign (1.502 and 1.406) for walking and bike. However, it is found that when compare to the other parks, Saga castle park is more limited in number of parking spaces to adequately accommodate car users. This becomes one of the obstructiveness on park utilization that need to be considered for improvement in the provision of park accessibility.

CONCLUSION AND FUTURE RESEARCH

This paper presents a multinomial logit model on the type of recreational service for case study of developed country. The selected parks for conducting survey is chosen according to the social benefits and opportunities service to community that are Shinrin park, Saga castle park and Kono park. An interview survey was conducted with 289 useful individuals' information during park visitation on both weekday and weekend in Saga city. A basic descriptive information about the participants is presented in the previous section as well as the calibration of the behavior pattern on park utilization are performed based on the socio demographic characteristic of respondents and characteristics of recreational trips. The analysis of park users' behavior can be drawn for the conclusions as follows:

Characteristics of park users and users' behavior

Different group of users with in the society exhibited different patterns of use at different times of the day and week. The findings revealed a clear pattern of use of parks throughout the model. Along with this study, the different pattern of activity that is designated by the users can provide useful information for planners to improve park service according to users' requirement. In order that such a park can be well designed and maintained according to community needs, the improvement on the opportunity or accessibility to obtain the service and the appreciation on the site visitation should be also considers.

Accessibility and attractiveness of park

This study attempted to provide a tool for monitoring the accessibility and attractiveness of park from users' point of view. The more attractive and accessible of park site can contribute to the liveability of city that is one of the determinants for sustainable conurbations. Since the relevance of parks to peoples' everyday lives provide an opportunity to enhance the quality of life, the improvement of the quality of park service in the provision and maintenance of a good system of parks in the this city is unavoidable to be considered.

However, several extensions of the current study can be identified that more comprehensive data is necessary to retrieve more reasonable and reliable results than the existing one. Along with a methodological problem in the application of parameters of attractiveness and accessibility of park, it is difficult to cope with the variation of perception to launch the effectiveness policy. In addition, GIS also need to be applied since this tool has potential to deal with geographical data and locational analysis. By incorporate with GIS, the integration of these schemes can provide fruitful insights about park users' behavior and to launch more specifically plan to fulfill the community needs.

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