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A Study of the Effect of Core Facilities and Core Recreational Programs on Urban Parks' Attractiveness

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核心施設과 核心 Recreational Program이 都市公園 魅力度에 미치는 影響에 關한 硏究

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요 약

본연구는 Homans의 Social Exchange Theory에 근거하여 특정 공원의 매력도(attractiveness)와 핵심시설(core facility), 핵심recreational program과의 관계를 규명하였다. 즉, 공원의 매력도를 일정 행동에 대한 가치로, 특정 공원의 방문을 개개인의 행동선택으로 생각하여 가설을 제시하고 검증을 한 결과 핵심시설과 핵심recreational program이 증가함에 따라서 공원의 매력도가 증가함을 보이고 있다. 또한 설정된 모델은 두 변수로 특정공원의 매력도를 65% 설명하고 있다. 이 결과는 특정 지역의 자연조건과, 현재 또는 잠재적 이용자들의 선호를 바탕으로 핵심시설과 핵심recreational program을 도시공원이 제공해 주면, 그 공원의 매력도는 증가하며 따라서 공원시 만족도와 이용 빈도를 늘릴 수 있다는 구체적인 증거를 제시하고 있다.

I. INTRODUCTION

An understanding of park use can be obtained in two distinct manners - the first being the individual's choice of parks, and the second the parks' attractiveness which leads people to use them. Most research in fields such as Geography, and Recreation and Parks has focused on the former. Their major concern has been prediction of spatial choice behavior based on developed models (fotheringham, 1983 : Cadwallader, 1981 : Hua and Porell, 1979). Although Landscape Architects as suppliers of physical environments need to put more enphasis on the latter to increase use intensity of parks, unfortunately, this has not been the case.

This research proposes to investigate the following question : Do users' preferred groups of facilities and recreational programs provided in the parks contribute to the increased attractiveness of the parks ? The main purpose of this issue concerns moving away from the traditional "head counting" approach, and toward a systematic understanding of reasons why some people visit a park more frequently than others by introduction of concepts of core facilities and core recreational programs. Specific kind of facilities and recreational programs which park users in one city prefer may not be identical to those of another city. However, core facilities and core recreational programs can be identified in

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parks of each city ; therefore, the concept of core facilities and core recreational programs can be applied to parks of all cities.

II. DEFINITION OF TERMS

(1) Core Facilities
Facilities which park users of one city use frequently
(2) Core Recreational Programs
Recreational programs in which park users of one city participate frequently
(3) Attractiveness of Park
Degree of potential to draw people to parks

III. HYPOTHESES

(1) As the number of core facilities a park has increase, the attractiveness value of park will increase significantly.
(2) As the number of core recreational progra ms a park has increase, the attractiveness value of the park will increase signifcantly.

IV. REVIEW OF RELATED LITERATURE

(1) Social Exchange Theory

A major conceptual framework for this study is a social exchange theory (Homans, 1974). Rational proposition, the most important proposition of the theory for this study, states that choosing between alternative actions, a person will choose that one for which, as perceived by him at the time, the value, V, of the result, multipled by the probability, P, of getting the result, is the greatest. In so acting, a person is said to maximize his expected utility. The proposition becomes simplified if each of the alternative actions is certain of success, so that $p=1$. Then the man's choice depends only of the relative value of the results. The prsent study regards the value of the results as attractiveness values of parks, and regarded a person's choice as selection certain parks.

(2) Preferred facilities

One of the important factors in open space planning is user needs and their preferences fo the use of public open spaces which are often ignored by planners. Gold (1978) stated that recreation planning and design has been dominated by the use of arbitrary standards and irrelevant concepts. Most of the ideas in current use are premised on the thinking of the 1930s about recreation and open space preservation on cities.

U.S. Department of Interior (1979a : 1979b) found general trend of users' needs that widespread concern are lack of facilities in neighborhood parks(15%), and the demand of recreation has shifted from passive, traditional rest and relaxation types of recreation such as walking in the park and picnicking, to more strenuous activities such as jogging, tennis, and racquetball. However, Airola and Wilson (1982) fond both passive and active activities are in great demand by all respondents, indicating a desire for diversity of recreational experience. These include activities that are provided at a variety of outdoor recreational facilities. They range form facilities designed for specific types of active recreation to less highly altered environments more suitable for passive forms of recreation. Natural areas are the single most desired recreational characteristic in their research.

Kraus and Washington (1985) found that a high proportion of those taking part in specific activities such as baseball, softball, and football rely heavily on using park facilities to carry on these pursuit. More specifically, respondents give the highest priority to active sports and games, special events, and fitness program. Five most popular active games and sports are basketball, softball, baseball, football and tennis and at least 80 percent of these activities are conducted at parks. Also, Washburne (1978) and Cheek et al. (1976) reported that the most frequent activities in parks are picnicking, walking and hiking, team sports such as baseball, swimming, and using playground equipment, and all these activities are done dominantly with friends or family. Godbey (1985), and Alterman and Amir(1983) found that when a unique facility for sports activities is available, the public open space tends to draw visitors from farther away, and special facilities

provided by recreation and park department service is most preferred by the respondent (228 out of 300) than any other services.

As Westphal and Lieber mentioned(1986), park visitors will consider their destination among possible choices, and the selected destination should reflect a perceived maximization of the satisfaction they can obtain from the attributes provided in a park.

(3) Recreational Programs

Encouraging a continual stream of new programs is a primary managerial task, and it ensures that recreation and parks agencies remain relevant(Crompton, 1983). Edginton and Neal (1983) discovered by way of a nationwide survey among directors of park and recreation departments that think they that maintaining ahigh level quality program was the most important goal, followed by the establishment of programs to meet needs in community(the third), and proper supervision of program(the fourth). This was reflected not only in terms of the current situation, but also in terms of future importance.

However, the program life cycle concept, a modified concept of the product life cycle, suggests that existing programs must cease in order to be replaced by new programs, but a new program needs time and money to reach its full potential (Howard and Crompton, 1980). This may deter some officials from supporting major new programs. Since they will incur the adverse political impacts associated with the high start up costs of a program, while the benefits coming from it are reaped by their successors(Crompton, 1983). Attitude about leisure, also, may serve as a deterrent to participation. The traditional work ethic of the U.S. is still evident today. Adults who were reared in families with a strong work ethic, or who have close friends or spouses who are very work-oriented, may believe that leisure has no values and serves no real purpose. Faced with the numerous and complex demands of daily life, such adults may not be willing to make the time to participate in recreation(O'Sullivan, 1986)

Rossman(1982) found that people engage in programs and are satisfied with them because of the opportunities they provide for individual achievement, physical fitness, and social contact. O'Sullivan(1986) and Sprague(1980) revealed that many programs rely heavily on competition and classes as primary forms of recreation. Such programs are relatively easy to organize and attract large numbers of adults who were successful in similar types of activities during childhood. Programs that have had high percentages of singles enrolled in the past include ; drop in volleyball ; softball ; folk dancing ; auto mechanics ; and almost any kind of home repair or construction of useful household objects class.

V. RESEARCH METHODS

(1) Parks and Site Studied

The survey was carried out in the city of Bryan, Texas, and all of 43 parks in Bryan and College Station(C.S.) were included for this study. The reasons for selection Bryan as the study area are as followings : (i) easy access to information ; (ii) sufficient population(44,337 persons) : (iii) proximity to the city of the C.S. ; both cities provide a sufficient number of variety of parks (43 parks) ; (iv) good mix of minority groups and ; (v) a fairly even distribution of income levels (U.S. Department of Commerce, 1983). More details were described on previous publication (Hong, 1980).

(2) Sampling procedure

To obtain more generalized result, 348 households only in Bryan were selected because of severely skewed demographic distribution of the C.S.(Hong, 1989). Because it is not economical to visit the selected respondents who lived scattered about in Bryan, a three stage stratified cluster sampling technique was conducted. A city block was a cluster, and clusters were stratified by using the socio demographic characteristics. The stratification of clusters enhanced the accuracy of cluster sampling by increasing homogeneity between clusters in a stratum.

In the first stage, 4 criteria were used to stratify and select 87 city blocks among the 907 city blocks in Bryan, which were ; percentage of blacks

people, percentage hispanic people, percentage of persons under 18 years of age, and the mean dollar values of houses in each city block(U.S. Department of Commerce, 1982). After stratifying all the city blocks of Bryan, the actual number of residents in the blocks of groups were numbered sequentially in order to sample the blocks systematically by a probability proportionate to size. The reasons for selection 87 city blocks were that (i) 3 to 5 households could be selected from a cluster, and (ii) approimately 350 samples were needed to test the hypotheses when the response rate was taken into consideration. Although Babbie(1973) stated that population researchers conventionally aim for the selection of 5 households per census block, the rationale for selecting 3 to 5 households per block was to maximize the effect of the probability proportionate to size sampling, and to increase the number of clusters. The sampling interval was 510 for selecting the 87 city blocks systematically because the total population of Bryan was 44,337 and 87 blocks were needed (44,337/87=510).

In the second stage, a subdivision map of the city of Bryan with 1"=1,000' scale was used to choose households in the selected city blocks. Three to five households were selected systematically with random start by probability proportionate to size of block residents. To decide the specific number of residents to be selected, chosen blocks were arranged in the order of the number of resicemts in each block. Three residents were selected from each block of the first third of arranged blocks. Four residents were selected in each of the blocks of the second third. Five residents were selected in each of the blocks of the final third of the arranged blocks. In all, 348 households were selected.

In the third stage, the respondents in the chosen households were sampled. The respondent was an adult member of a household whose birthday was the most recent. This method enabled the researcher both to obtain maximum randomness within each chosen household, and to achieve the information necessary to complete the survey. Therefore, the basic unit for data collection was an adult.

(3) Questionnaire

Open ended questions were utilized to measure the attractiveness values of chosen parks, and to identify both core facilities and core recreational programs. To measure the attractiveness of parks, a reduced map of the city of Bryan and C.S. was attached to the questionnaire in order for respondents to mark the locations of the parks they use most frepuently, and then to rank them as to the frequency of their visiting them. To idintify core facilities and core recreational programs, respondents were asked directly the kinds of facilities and recreational programs they frequently used in those parks.

(4) Data Collection

The survey was conducted between May 16th and June 5th, 1987, in the city of Bryan by a personally delivered, self-administered questionnaire. This method had dual purposes. One purpose was to achieve a higher response rate. A high response rate is critical to reduce sampling error and to draw reliable conclusions. The other purpose was to identify the exact location of respondents' house. They were marked on a subdivision map of Bryan to measure the distance from them to each park in Bryan and the C.S. The questionnaire was distributed and collected at the following day between 3 and 8 p.m. during weekdays, and between noon and 8 p.m. during weekends. If all members of the selected household were gone, the questionnaire was then attached to the door by a sticker. On the cover page, a specific time range to collect the questionnaire during the following day was recorded in red ink, and residents were asked to attach the filled in questionnaire on the door if nobody was planning to be at home at the planned time frame. Fourteen blank questionnaired were collected and 200 completed questionnaires were returned. Therefore, the response rate was 57.8 percent.

VI. OPERATIONALIZATION OF VARIABLES

(1) Core Facilities

Core facilities in parks were decided by directly inquring from respondents the facilities they most frequently used, then the list of preferred facilities was categorized into 2 homogeneous groups by use of the square root cumulative method which were called core facilities and non core facilities (Scheaffer et al., 1979). Core facilities were decided to be the picnic facility, children's playground, swing, swimming pool, ball diamond, bench, and trail(Table 1).

Table 1. Core Facilities and Non core Facilities

Facility	Frequency	√Frequency	Cumulative √Frequency
Picnic Facility	105	10.247	10.247
Playground	46	6.782	17.029
Swing	40	6.325	23.354
Swimming Pool	38	6.164	29.518
Baseball, Softball	33	5.745	35.263
Bench	26	5.100	40.363
Trail	25	5.000	45.363
Open Space	24	4.899	50.262
Basketball	20	4.472	54.734
Slide	18	4.243	58.977
Merry Go Round	17	4.123	63.100
Tennis	10	3.162	66.262
Monkey Bar	9	3.000	69.262
Golf Course	8	2.828	72.090
Fishing Facility	6		
Tree	6	3.464	75.554
Football Field	5		
Soccer Field	5		
Volleyball Court	5		
Seesaw	5	4.472	80.026
Wading Pool	4		
Concession Building	4	2.828	82.854
Climbing Apparatus	3	1.732	84.586
Bathroom	2		
Gym Equipment	2		
Drinking Fountain	2		
Animal	2	2.828	87.414
Deck/Pier	1	1.000	88.414

However, the swing and bench were excluded from core facilities for the following reasons. All parks in Bryan and the C.S. have swings in the children's playground, and it was very difficult to distinguish a bench from other things people sit on. Any of these can be substitutes for the benches (Whyte, 1980 ; Iso-Ajola, 1986)

(2) Core Recreational Programs

Core recreational programs were decided in a similar fashion to the decision for core facilities. They were decided by direct inquiry from respondents as to the recreational programs they most frequently participated in while using parks, then a list of the most frequently used recreational programs was classified into core recreational programs and non core recreational programs by use of the square root cumulative method (Scheaffer et al., 1979). Table 2 shows the list of recreational programs of parks that are frequently participated in. As a result, the core recreational programs were decided to be the softball/baseball league, swimming lesson, soccer program, concert, and festival.

Table 2. Core and Non core Recreational Programs

Program	Frequency	√Frequency	Cumulative √Frequency
Softball/Baseball	38	6.164	6.164
Swimming Sesson	22	4.690	10.854
Soccer Program	12		
Concert	12	4.899	15.753
Festival	8	2.828	18.581
Day Camp	7	2.646	21.227
Volleyball	6		
Christmas Program	6	3.464	24.691
Basketball	5	2.236	26.927
Football	4	2.000	28.927
Fishing Contest	3		
Mobile Book Library	3	2.449	31.376
Movie	2		
Tennis	2	2.000	33.376
Kite Contest	1	1.000	34.376

(3) Attractiveness Value

The measurement of the attractiveness of a park was calculated by the use of 3 equations suggested by Ewing and Kulka(1979), Thurstone(1959), and Mosteller(1951). Hong(1989) described detailed procedures how to apply these equations to

estimate attractiveness values of parks.

$$P_{jk}' = \frac{C_{jk}/N_{jk}}{C_{jk}/N_{jk} + C_{kj}/N_{kj}} \quad \text{for } N_{jk} \text{ and } N_{kj} > 0$$

P'_{jk} : relative preference of park j over park k

C_{jk} : number of times that park j is chosen over park k although park j is more distant than park k

N_{jk} : the number of respondents for whom park j is a more distant alternative than pank k

$(A_j - A_k)' = X_{jk}'$

$(A_j - A_k)'$: difference of attractiveness between park j and park k

X_{jk}' : sigma value corresponding to the proportion of judgement $P'_{j>k}$

$$A'_j = \frac{1}{n} \sum_{k=1}^{n} X'_{jk} \qquad j=1,2,3.....,n$$

A'_j : attractiveness of park j

n : number of compared parks

Ⅷ. RESULTS

The attractiveness values of parks in Bryan and the C.S., the number of core facilities and the number of core recreational programs were needed to test both the first and the second hypotheses. However, it was found that the parks of the C.S. cause a severe bias in the attractiveness values of parks. The reason for this biased calculation was due to the limited area of sampling. Only the residents fo Bryan were selected to calculate the attractiveness values of parks both in the C.S. and Bryan. P'_{jk} in equation is the function of C_{jk}/N_{jk} and C_{kj}/N_{kj} for park j and park k. If park j was located in the C.S., N_{jk} was almost always larger than N_{kj}. Moreover, collected data confirmed that parks are low-involvement products (Kassarjian and Kassarjian, 1977). Fifty-three percent of the total respondents made use of the nearest park to their home. This fact can be interpreted that barring any special motivation, respondents do not travel long distances to visit parks. Such a tendency invited strongly biased results for P'_{jk}. Because the equation suggested by Ewing and Kulda(1979) was the pairwise comparion between two parks, which resulted in biased results in the attractiveness value of the parks both in the C.S. and Bryan, the relative preference of park j over k (P'_{jk}) was calculated again with all parks in Bryan except the Bryan Municipal Golf Course and Hensel park in the C.S. Hensel park was included in the calculation of P'_{jk} because it is located within the city limits of Bryan. The Bryan Golf Course was excluded because it is a special facility. As a result, a total of 19 parks were considered to be tested by the first and second hypotheses. Hence, from a total of 19 parks, Table 3 shows the attractiveness value of each park, the number of core facilities, and the number of core recreational programs contained in them.

Table 3. Attractiveness Values of Parks in Bryan

Park	Attractiveness Value	Number of Core Facilities	Number of Core Recreational Program
Astin	0.265	2	1
Bonham	-0.528	2	0
Brazos County	-0.935	2	0
Bryan Sport Complex	-0.110	3	1
Burton Creek	0.591	2	0
Castle Height	0.500	2	0
Henderson	-0.472	4	0
Lions	-0.603	1	0
San Jacinto	-0.434	2	0
Scurry	-0.216	2	0
Sue Haswell	0.910	4	1
Sul Ross	0.589	2	0
Tanglewood	1.083	3	2
Thomas	0.401	4	0
Travis Ball	-0.125	1	0
Washington	0.641	2	0
Williams	0.620	2	0
Williamson	0.155	3	0
Hensel	0.038	2	0

The model that were tested to find the relationship among the attractiveness of parks, the number of core facilities and the number of core recreational programs was ;

$$Y_j = b_0 + b_1X_{1j} + b_2X_{2j} + b_3X_{1j}X_{2j} \quad \cdots\cdots\cdots\cdots (1)$$

Y_j : attractiveness value of park j

X_{1j} : number of core facilities of park j

X_{2j} : number of core recreational programs of park j

$X_{1j}X_{2j}$: interaction term

The results from the model (1) was unsatisfactory. Table 4 showed that model (1) is specified correctly at a = 0.05 level of significance. However, a t-test for each parameter indicated that all variables are not significant. The reason for this dissonance between the f-test and the t-test is due to the existence of high multicollinearity. Neter et al. (1978) stated that a maximun $(VIF)_K$ in excess of 10 is often taken as an indication that multicollinearity may be unduly influencing the estimation of the least squares. The variance inflation factor shown in Table 4 indicates that there is a high multicollinearity between the number of core recreational programs in a park and the interatction term.

Table 4. Regression Analysis by Model (1) with 19 Parks

ANOVA Table

Source	df	Sum of Squares	Mean Squares	F Value	Prob > F
Model	3	2.53805399	0.84601800	3.727	0.03449
Error	15	3.40480443	0.22698696		
C Total	18	5.94285842			

Para meter Estimation

Variable	Parameter Estimate	Standard Error	T for H_0= Parameter=0	Prob> | T |
Intercept	-0.49438889	0.34611945	-1.428	0.1737
Facility	0.12447917	0.14587676	0.853	0.4069
Program	-0.04609722	1.09019675	-0.042	0.9668
Interact	0.19802083	0.36711512	0.539	0.597

Variable	VIF	Type I SS
Intercept	0.00000000	
Facility	1.35197368	1.06641185
Program	29.76315789	1.40560045
Interact	31.56250000	0.06604168

Therefore, the interaction term was deleted from the model for following two reasons.

(i) A "lack of fit" test with two variables number of core facilities, and number of core recreational programs-- indicated that the liner type of variables are significant(p = 0.002), while the crossproduct types of variables are not significant (p>0.5).

(ii) The type I sum of square regression in Table 4 indicates that the number of core recreational programs contributes much more than the interaction term in the sum of square regression

Also, two data points were identified as outliers in this analysis by use of a "studentized residual." Therefore, two data points were deleted. The second model which was used to test hypothesis 1 and hypothesis 2 was :

$Y_j = b_0 + b_1X_{1j} + b_2X_{2j}$ ·····(2)

Y_j : attractiveness value of park j

X_{1j} : number of core facilities of park j

X_{2j} : number of core recreational programs of park j

Table 5. Regression Analysis by Model (2) with 17 Parks

Source	df	Sum of Squares	Mean Squares	F Value	Prob>F
Model	2	3.21190691	1.60595345	13.033	0.0006
Error	14	1.72507215	0.12321944		
C Total	16	4.93697906			
R-SQUARE	0.6506				
ADJ R-SQ	0.6007				

Parameter Estimation

Variable	Parameter Estimate	Standard Error	T for H parameter=0	prob> | T |
Intercept	-0.77262881	0.24311224	-3.178	0.0067
Facility	0.19102881	0.09907465	1.928	0.0744
Program	0.60410169	0.15830850	3.816	0.0019

Table 5 shows the results of regression analysis by use the model(2) :

$Y_j = 0.77262881 + 0.19102881X_{1j} + 0.60410169X_{2j}$.

Parameters of this model indicate that the number of core facilities within a park is significant at a = 0.1 level of significance(p = 0.0744), and the number of core recreational programs within a park is significant at a = 0.01 level of significance (p = 0.0019). Also, when the number of core facilities and the number of core recreational programs are included in the model, the variation

in the attractiveness value is then reduced by 65. 06 percent. To find out whether this model is correctly fitted with the data, a "lack of fit" test was conducted. This test confirmed that model $Y_i = b_0 + b_1X_{1i} + b_2X_{2i}$ fitted well with the data ($p = 0.0006$).

The results shown above are significant enough to indicate that both the number of core facilities and the number of core recreational programs have strong positive influences on the attractiveness of parks.

Ⅷ. APPLICATION THE FINDINGS

Based on Homans' theory, this study attempted to determine whether the number of identified "core facilities" or the number of identified "core recreational programs" in parks has a strong influence on the increase of attractiveness values of parks. Hypotheses testings showed that hypotheses are valid. The results demonstrate that the increased number of core facilities or number of recreational programs in parks positively affect the attractiveness values of the parks, which results in increased use, which is consistent with Homans' theory.

Possibly more important was the finding that a one unit increases of core recreational programs is approximately 3 times more effective in increasing the attractiveness values of parks than a one unit increases of core facilities(Table 5). These findings imply that provision of core recreational programs in parks is far more effective than that of the core facilities in increasing the attractiveness of parks. Howerver, the need for core facilities should not be overlooked.

Like other models formulated in social research, this model used does not fully explain the variation of the attractiveness valuse of parks with just the two variables even though the coefficient of multiple determination is high($R^2 = 0.65$). Thus the 35 percent variation in the attractiveness value of parks must be due to other variables not explained by this model. But, this model does have sufficient power to explain the attractiveness of parks to make it worth applying to real situations.

Ⅸ. APPLICATION THE FINDINGS

Core facilities and core recreational programs represent a limited number of facilities and recreational programs which the majority of park users in a city believe parks need to have to be attractive to them. In the past facilities have, more than likely, been provided based on normative "standards" promulgated by recreation departments, government, and service organizations. Decisiond based on these assumed needs may very well not satisfy the potential users expectations. This serves to underscore that while identification of core facilities and core recreational programs in one city is important to maximize the user's satisfaction within the limit of given resourecs, the kinds of core facilities and core recreational programs may vary among parks of different cities. The parks of each city have their own unique conditions, and uses' needs for park use in one city are different from those in others.

The identification of core facilities and core recreational programs in a city should play a critical role in the determination of the kinds of facilities and recreational programs to be provided for the following reasons : (i) core facilities and core recreational programs are factors that will increase park use ; (ii) they are determined by users of parks not by designers ; and (iii) they enable park designers and recreation administrators to cost effectively provide user' satisfaction.

The fact that core recreational programs and core facilities significantly influence the increase in the attractiveness of parks couple with the finding that over 50 percent of the sample population visited the park closest to their residence further underscores the importance of identification of core facilities and core recreational programs in parks. The fact that people tend to visit the closest park implies that the majority of park users are not very discrimination in choosing a park to visit. This is probably because they think they might achieve as much satisfaction from one park as the next.

But if the proper mix of core facilities and core recreational programs can be identified, it may lead to more positive attitudes toward a particular park, resulting in more intensive use(Fishbein, 1963).

These findings suggest to park planners and recreation administrators that the concepts "core facilities" and "core recreational programs" can be applied in park planning and management, with specific core facilities and core recreational program identified locally.

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