A VISITATION MODEL FOR SELECTED CAMPGROUNDS IN THE PROVINCE OF QUEBEC

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ABSTRACT

A VISITATION MODEL FOR SELECTED CAMPGROUNDS
IN THE PROVINCE OF QUEBEC

By

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The present study was undertaken to estimate participation in selected campgrounds in the Province of Quebec. In Quebec none of the Provincial Parks are used exclusively for recreation and all of them are used simultaneously for timber, mining and recreation output. To achieve this, a systematic sampling survey was first made in the city of Sainte-Foy located in the vicinity of the city of Quebec. This was done by sending a questionnaire to every fifth family for a total of 1700 households who were asked to participate in the survey. The purpose was to find out which socioeconomic characteristics have a significant influence on the camping participation originating from this city. The 693 answers received were processed by regression analysis. Although some variables within the equation were statistically significant at the .90 level of confidence, they did not account for a great deal of the variation around the mean of the dependent variable: the coefficient of determination (R^2) for the equation was 0.074, which indicated a pocr goodness of fit.

The results thus obtained indicated that with this type of model, it is very difficult to make an estimate of future participation; yet the use of the "t" test and the chi-square indicated quite clearly which socioeconomic characteristics used could have a significant influence on camping participation.

The process of analysis revealed that the younger populations, the people with lower incomes and those with larger families have a tendency to produce a large number of camping days, whereas non-campers tend to belong to the older age classes and have higher incomes and smaller families.

In a second study with a different approach, a sample was made of the participation recorded in three different campgrounds as established by governmental statistics for 1971. The purpose of this study was to define the relationships between campgrounds participation and different characteristics of the zones of origin of the campground users. Three sets of data were collected: 1) the socio-economic characteristics of the zone of origin; 2) the communication characteristics between the zone of origin and the zone of destination; and 3) the attraction characteristics of individual campgrounds.

These selected characteristics (independent variables) were then related to campground participation (dependent variable) in statistical models.

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By means of a stepwise regression analysis the size and slope of the regression coefficients were estimated. The coefficient of determination (R^2) for each of the three campgrounds ranged between .56 and .69. The equations developed were then used to estimate the future participation in camping at the different campgrounds.

It was found through these equations for the years 1975 that the participation of the population will have increased by 18%, 18%, 9% for each of the three campgrounds respectively. For 1980, the predicted increases in participation will be 35%, 26% and 15% for each of the three campgrounds respectively.

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INTRODUCTION

Recreation and leisure are two words that we hear more and more in everyday conversation. Sociologists, politicians, union leaders, clergymen and university professors are greatly concerned with the notion of leisure and recreation which is constantly assuming greater importance in the life of every citizen of industrialized countries.

Furthermore, it seems that trends are such that in future decades, recreation may become a field of activity so important that it could have a primordial influence on the economy and social order of the civilization of tomorrow.

It would be interesting to analyze the evolution of this phenomenon as well as the ultimate results of its development, but we will have to limit the scope of our investigation to working out some of the mechanisms of its implementation, taking into account the economic and social factors involved. These various concepts will be considered time and again in the course of the present study which will be restricted mainly to that part of outdoor recreation which is called camping.

Let us first find a proper and appropriate definition for recreation. In most cases, differences of opinion on the notion of recreation is due to restricted meanings in the definitions used by different authors. For instance, in their definition of recreation, Clawson and Knetsch noted that: "Recreation, as the word is used in this book, means activity (or planned activity) undertaken because one wants to do it."[1] The Neumeyers, distinguished sociologists who took a special interest in the field of leisure, have defined recreation as follows: " . . . any activity, either individual or collective, pursued during one's leisure time."[2]

In the present study a definition of recreation is proposed, which is as broad as possible and which would be more satisfactory than those just mentioned. Such a definition can be formulated as follows: Recreation is any action, other than those answering a basic physiological need such as eating or survival or basic psychological needs, which satisfied the needs of the individual during the time that he is engaged in this particular action. It is important to note that such a definition is underlain by the basic principle that a rational man always tries to satisfy his needs.

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[1]Marion Clawson and J. L. Knetsch, Economics of Outdoor Recreation (Baltimore: John Hopkins Press, 1966), p. 6.

[2]Martin H. Neumeyer and Esther S. Neumeyer, Leisure and Recreation (New York: Ronald, 1958), p. 17.

However, we must keep in mind that man's outlook may be governed by two different approaches to the problem. First, he may have a long-term motivation behind the initiatives he takes; he is then probably trying to satisfy future needs. A good example of such long-term planning is when an individual, in order to develop his faculties and perfect his mind, spends a good part of his early life studying. He may prefer to do other things during these years of his youth, yet he keeps on studying since he hopes, in so doing, to satisfy future needs. In opposition to the above, a large number of man's actions are characterized by very short-term planning. This is especially true when he attempts to satisfy his needs by proceeding at once with the execution of his projects. Such a short-term approach is well illustrated when a boy watches a hockey match or a football game instead of studying. He then satisfies his immediate needs while watching the game, and his future is the least of his cares. Some individuals succeed in combining work and recreation; for instance, if writing this paper completely satisfies the individual's actual needs and, at the same time, contributes to a proper satisfaction of his future needs, it is then considered a recreational experience as well as a valuable work achievement.

The above discussion on the definition of recreation includes certain specific indoor or outdoor activities which are considered as integral parts of recreation. As mentioned above, this study deals exclusively with outdoor recreation activities and constitutes a rationale for including at this point, a discussion on the characteristics of this particular type of recreation.

One of the main requirements for most outdoor recreation activities is the availability of certain types of natural resources. Indeed, outdoor recreation activities cannot very well be enjoyed without the presence of bodies of water, forests, swamps, mountains or other natural features. In this respect, outdoor recreation is no different from any other use that man may have for natural resources, such as farming, mining or timber harvesting. Yet it is important to remember that there is nothing in the physical landscape of any particular piece of land that makes it a recreation resource. It is really the combination of the natural qualities of the environment and the ability and desire of man to use these for his personal enjoyment that makes a useful resource out of what otherwise would be a meaningless combination of rocks, soil and trees.

It may be said that outdoor recreation is very rapidly becoming one of the major users of the nation's natural resources. Some existing data indicate that the present trend in this direction will likely increase during the next decades. For example, estimates prepared by Outdoor Recreation Resource Review Commission indicate that the demand for recreation facilities will have doubled by the year 2000, even if the participation of each citizen presently engaged in this type of activity does not increase above the present levels.[3] However, it is preferable to be very cautious with such predictions, because studies have indicated that a saturation point has already been reached for many activities and that a decline may be indicated for the near future. A good example of such a phenomena is the snowmobile market which, for the last couple of years, has leveled up and may even decrease in the near future.

In the past, research in the field of demand for outdoor recreation has been very scarce and irregular. Such research has also been greatly influenced by many fundamental problems resulting from the attitude of many workers in the field of recreation. Chappelle, in a state of the art paper takes a comprehensive look at these basic problems.

The source of many problems in the field of recreation is as mentioned by Chappelle: "It appears that most recreation professionals hold strongly to the basic tenet that all people "need" recreation, or even more

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[3]U.S. Outdoor Recreation Resource Review Commission, Outdoor Recreation for America (Washington, D.C.: U.S. Government Printing Office, 1962), p. 30.

extreme, that all people need certain types of outdoor recreation activities and experiences."[4]

Such an affirmation appears quite groundless as it does not seem to be based on facts and is not the result of serious studies. In fact, this author was unable to find scientific research that reached such a conclusion.

Also according to Chappelle several subtenets seem to derive from the above such as: "the population's 'needs' for recreation must be fully satisfied" and "that recreational services cannot be priced in the way other goods and services usually are."[5]

Acceptance of the above premises by individuals supposedly specialized in the field of recreation can give a wrong orientation to research programs undertaken in that field. Indeed, if these premises were true, what would be the necessity of doing any research on the demand aspect of recreation?

However, even if the two above-mentioned premises were true, it would be absolutely impossible to satisfy them completely on account of the limited quantity of natural resources and the important concurrence between the different potential users. It is the author's confirmed opinion that for the proper administration, distribution

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[4]Daniel E. Chappelle, "The Need for Outdoor Recreation: An Economic Conundrum," Journal of Leisure Research, 5 (Fall), p. 47.

[5]*Ibid.*, p. 47.

and conservation of the natural resources available for outdoor recreation purposes, a price must be attached to almost every use required by the people who choose this way of enjoying Quebec's natural resources. Thus it becomes necessary for the individual who chooses to visit and use public outdoor recreation areas to weigh the cost of other goods or services (including other types of recreational activities) that he might have acquired for the same amount of money. There is a personal choice to be made which depends in large measure upon his personal scale of values and his preferences, but conditioned also by many social factors inherent to that specific level of the society to which he belongs.

Some key elements in outdoor recreation are shown in the following chart which has been drawn from two different figures; one by R. I. Wolfe,[6] and the other by the Government of Ontario.[7]

As stated above, conflicting demands exist between industries and the people involved in outdoor recreation concerning the use of the same resources. Furthermore, experience shows that various segments of the population may

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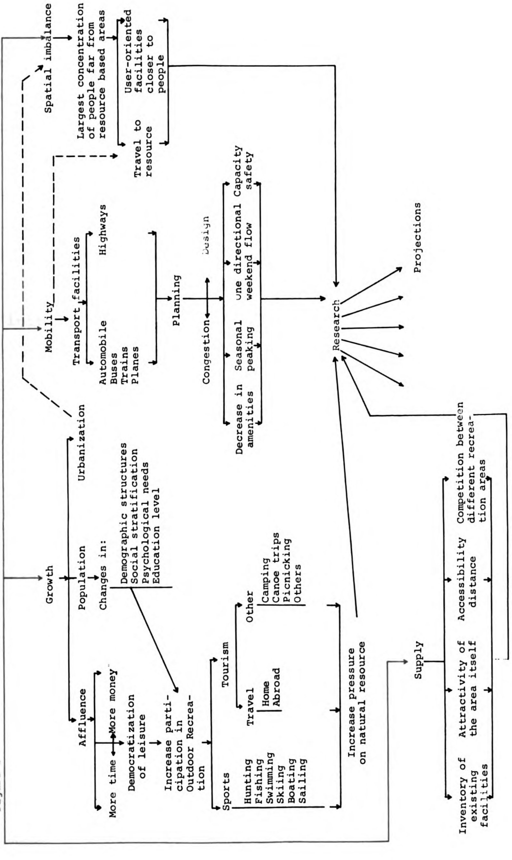
[6] R. I. Wolfe, "Perspective on Outdoor Recreation: A Bibliographical Survey," The Geographical Review, (19), p. 213.

[7] Ontario, Department of Tourism and Information, Tourism and Recreation in Ontario. (Toronto: Department of Tourism and Information of Ontario, 1970), pp. 11-25.

Figure 1

ELEMENTS IN OUTDOOR RECREATION



have demands which differ considerably from one another and are often conflicting within the field of outdoor recreation. For anyone having the responsibility of making such recreational activities available, it is of primary importance to take these factors into consideration before determining the types of land and water resource developments to be undertaken by public as well as by private developers.

It is of utmost importance to establish first some definite objectives which are pursued in predicting demand for outdoor recreation. These objectives can be listed as follows:

1- Identify and analyze present and potential outdoor recreation issues and opportunities.

2- Propose and evaluate alternative approaches in predicting demand for outdoor recreation.

3- Acquire a proper understanding of the components and interactions of the recreation system.

4- Evaluate the demand for different types of recreational activities.

5- Develop statistical planning tools to assist in the evaluation of the effects of proposed future developments.

6- Recommend governmental policy guidelines and strategies for outdoor recreation developments.

For many years, workers in recreational planning have repeatedly pleaded for "more data". More often, however, the data requested and collected pertain only to one narrow portion of the spectrum of outdoor recreation without an appropriate knowledge of what was collected and why such data were collected. In too many instances, data were collected simply for the sake of having statistics or simply to have the information, without knowing exactly what to do with such data.

Now, with the aid of a model and its broader framework, it is possible to see the interrelationship between numerous elements of the problem. Such a model also provides a comprehensive framework in which the data collected can be used. Furthermore, it shows what data might be needed and likely to be used within such a structure. It can show the relative priorities in the collection of different types of data. It also explicitely indicates how the information will be processed and what portion of the entire problem will be developed and explained.

It is important to be very cautious when developing a prediction model, because the basic data used in the model change very rapidly due to technological improvements in this field of activity which is so important to our society, and, as a result, the model can prove worthless within a very short time.

Yet, this sort of difficulty should not prevent us from developing models, and it is the author's opinion that it is worthwhile to develop complete models for shorter periods of time in order to have adequate adaptation to changing conditions. It is further possible that the true solution to this problem is that given by Chappelle when he says: "It is important to have a continuous process of model revision as conditions change."[8] That can mean more work and greater cost. However, according to Chappelle, it is not an insurmountable job and it should be possible, at least in theory, to develop simulation models for the various subsystems which can be both spatially and temporally dynamic.

Some years ago the institutional bases of society were quite stable and it was then possible to make acceptable provisions based on different socio-economic variables. It was then quite normal to believe that these variables would normally evolve according to a slow and regular pattern. However, during the last few decades, important changes have occurred in our basic institutions and have completely changed the approach that we might have taken a few years ago in solving any problem concerning

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[8]Daniel E. Chappelle, Quantitative Analysis in a Qualitative World: Modeling Forestry System to Improve Decision-Making. Workshop on Computer and Information System in Resource Management Decisions (Cleveland: Society of American Foresters National Convention, Septembre, 1971), p. 12.

socio-economic implications such as the one which is considered in the present study.

One of the major factors which make the building of an outdoor recreation model extremely difficult is the complexity and the rapid change taking place continuously in our society. It is very difficult to know what will happen to any particular component, even over a short period of time. There are a great numer of additional complications which are brought about by other factors such as the ephemeral quality of a great amount of today's goods as well as their increasing variety.

The above are only a few of the many different changes that occur in today's society. These changes make the work of researchers much more difficult than in the past and can cause great complications in the building of a model intended to analyze the needs of the society and make accurate predictions for the future of such needs, which is part of the present research program.

CHAPTER I

REVIEW OF EXISTING LITERATURE

As mentioned before, the problem of allocation for outdoor recreation activities has been ignored by researchers for a long time seemingly because the two following assumptions were generally accepted. First, it was assumed that every individual has a strong need for recreation and, second, that this need must be completely satisfied. Many professionals in the field of recreation are still convinced that the above-mentioned assumptions must be maintained. It must be said, however, that fewer of these professionals accept such a point of view nowadays, and that a great number of them are questioning its validity; as a result of this, during the last few years, valuable research programs have been initiated in order to estimate the demand for outdoor recreation. These research programs can be grouped according to the various characteristics they might have in common.

In the following section, some techniques used in estimating recreation demand are summarized. Many models have been prepared by various authors. The most important of these are presented below and can be grouped as follows.

The first group comprises models that estimate consumers' surplus, while the second group estimates demand originating from particular population centers or origin centers. These models are defined according to the various characteristics of a specific origin center which is the area from which most of the users come. Finally, the third group of models estimates the demand for a particular recreation site according to the characteristics specific to the site and not to the origin centers as in the two other types of models listed above.

Before we start describing the different models, it is important to mention one of the tools which have been used to forecast future outdoor recreation requirements; it is a time series of visits to specific recreation areas. Occasionally such time series have been linearly extrapolated and thus used to indicate the trend of annual visits over a number of years. This method has the advantage of being simple and easy to apply. However, it does not take into account possible changes in different socioeconomic factors thought to be important in affecting recreational participation.

The Demand Curve Models

Quite a few researchers are interested mostly in determining the economic value of outdoor recreation, because they feel the need of a common measure to compare recreational activities with other more easily measurable values of land uses.

Following the initial lead of Hotelling,[1] Trice and Wood[2] have suggested that the benefits which a person derives from his use of a particular recreation area are directly related to the distance he is prepared to travel in order to visit that area. It may be inferred, therefore, that the benefit is related to his travel cost. Trice and Wood proposed that an analysis be made of the point of origin of all people visiting a particular recreation area. These points of origin could then be plotted on a map and grouped into distance-zones around the recreation area. From data thus obtained, the average cost of travel from each zone to the recreation area could be calculated. The average cost of travel for visitors from any point in the most remote zone would set, as demonstrated above, a "market" value for the recreation opportunities afforded by the area. In this way, it could be reasoned that any visitor from a zone located closer to the recreation area would receive a certain amount of free recreation value, or consumers' surplus, equal to the difference between the

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[1] H. Hotelling, "Letter to R. A. PREWIT," in The Economics of Public Recreation (Washington, D.C.: National Park Service, Department of the Interior, 1947).

[2] A. H. Trice and S. E. Wood, "Measurement of Recreation Benefits," Lands Economics, XXXIV, 3 (1958) pp. 196-207.

average cost of travel from the most distant zone and the average cost of travel from the zone in which he lives. According to this method proposed by Trice and Wood, the economic value of this particular recreation area would be equal to the aggregate consumers' surplus and this could be obtained as follows: Calculate the difference between the average cost of travel from the most remote zone or "market zone" and the average cost of travel from each of the other zones; multiply such difference by the number of visitors from each of these zones; the sum of these products over all zones are taken as the value of the recreation area.

There is considerable disagreement concerning application of consumers' surplus to the assessment of recreational benefits, and a number of authors argue that such a value is not the equivalent of benefits. Some of their conclusions are quoted below.

Scott says: "The concept we seek, therefore, is not the area under the demand curve for visits, which would imply discrimination, but the largest profit rectangle that can be inscribed, which would imply a single price."[3]

It follows that a valuation which is to justify a recreational use of a piece of land must also be a

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[3]A. D. Scott, "The Valuation of Game Resources: Some Theoretical Aspects," Proceeding of the Symposium on the Economic Aspects of Sport Fishing, Report No. 4 (Ottawa: Dept. of Fisheries of Canada, May 1965), p. 27.

simulation of a competitive rent. The valuer must not assume that the hypothetical sale of recreational services discriminates between customers; all must be assumed to pay the same price per visitor-day.

Finally Coomber and Biswas mentioned that: "This, in effect, is a measure of total user benefits (consumers' surplus being equivalent to net benefits) and not comparable with normal market prices established for other elements of, for example, a multi-purpose scheme which includes recreational facilities."[4]

According to the author, such a comparison would be possible if the consumers' surplus for other goods were measured. However, the consumers' surplus could be used in order to compare the economic value of the different recreation developments. If we do so, the value of the comparison is of interest because a common basis is used to make the comparison. This method, however, does not suggest any way to construct a demand curve which could be used to estimate the consumers' surplus.

In order to enlarge on the method devised by Trice and Wood and make it more practical, Clawson[5] suggests a

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[4]Nicholas H. Coomber and Asit K. Biswas, Evaluation of Environmental Intangibles (Ottawa: Ecological Systems Branch, Department of Environment, 1972), p. 26.

[5]M. Clawson, Methods of Measuring the Demand and Value of Outdoor Recreation (Philadelphia: Resource for the Future, 1959), Reprint No. 10.

procedure which permits the building of a series of demand curves in order to measure recreation benefits of an area.

This is done in the following manner: For any given area already subdivided into a series of distance-zones, as described above, Clawson built a demand curve for each distance zone. In that curve, the abscissa is the number of visitors who visit the area per 1000 of population for each distance-zone. The ordinate is the total average cost per visitor. This comprises the cost of travel from the point of origin to the recreation area to which is added, for each distance-zone, an "entrance fee". The size of this fee is progressively increased with the distance.

This approach permitted Clawson to estimate the effect of a variable entrance fee on the number of visitors from any of the points or origin. The other variables, such as the socio-economic characteristics of the visitors, are assumed to be constant.

Once the demand curves were obtained, as described above, for each distance zone, Clawson built an integrated demand curve which showed the relationship between the number of visitors from the region around a recreation area and the admission fee, by adding for each individual zone the number of visitors corresponding to each level of entrance fee.

Based on the same principles as outlined by Clawson, but a little more sophisticated, the method of analysis devised by Knetsch[6] assumes that each distance group is different and reacts differently to a change in entrance fee. In order to achieve this, he proposes the following formula: $V = f(C, Y, S, G)$ where V = number of visits per 1000 population; C = cost paid by the park users for such visits including the cost of travel, food, lodging as well as the entrance fee; Y = income of the park users; S = number, or the density, of the competing recreational areas near the geographic area under study, and finally, G = degree of congestion in the area.

Other authors using the same basic formula as above have made interesting analyses of certain specific activities within a recreation area. For example, in 1965 Wennergren[7] estimated the demand for boating at various Utah reservoirs, using the relation between average number of trips per boat and average travel cost plus on-site cost.

A similar study by Smith and Kavanagh,[8] in 1968, concerned the empirical estimation of a Clawson-style demand curve for a trout fishery center. This study was based on

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[6]J. L. Knetsch, "Outdoor Recreation Demands and Benefits," Land Economics, XXXIX, No. IV, (1963).

[7]E. Boyd Wennergren, Value of Water for Boating Recreation, Bulletin 453 (Utah: Agricultural Experiment Station at Utah State University, 1965).

[8]R. J. Smith and N. J. Kavanagh, "The Measurement of Benefits of Trout Fishing: Preliminary Results of a Study at Grafham Water, Great Ouse Water Authority, Huntingdonshire," Journal of Leisure Research, 1, No. 4 (Autumn 1969).

data obtained at the Grafham Water, Hungtindon, England. The basis of the Clawson approach in this instance was a relationship between the distance from the place of living to the fishery and the number of visits from zones surrounding the fishery. Using this relationships, a total demand curve for trout fishing was constructed.

A more direct approach was used by LaPage.[9] He determined a demand curve by simply asking a sample of 712 families, whether they would camp "much more," "much less" or "about as much as they camp now" at standard Family camping fees of $1.00, $2.00, $3.00, $4.00 or $5.00 per night. Then, by assigning an arbitrary multiplier to the "much less" and "much more", the author constructed a rough demand curve. This method seems very subjective, and as LaPage noted: "At a later point in the interview, each camper was asked whether he was not camping as much as he would like and, if not, why not. The responses of these campers to this latter question appear to be quite inconsistent with their affirmation that they would camp more often if the entrance fees were at the minimum level of one dollar. Therefore such inconsistency in the answers of the consumer indicates that this approach is unreliable and should be used with great care.

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[9] W. F. LaPage, "The Role of Fees in Campers Decisions," Research Paper NE-118 (Washington, D.C.: U.S. Forest Service, 1968).

The Origin Center Models

An origin-center approach has often been used to determine the demand for specific geographical areas.

As population increases and competitive pressures for land preservation and development of recreation areas continue to increase, the necessity to estimate the demand originating from different population centers becomes evident. These studies were made by using a new set of models based almost exclusively on certain socio-economic characteristics specific to the population of these areas, such as: total population, income, age, number of children, etc. Based on this principle, Gillespie and Brewer[10] prepared a water-oriented recreation demand model by a method of direct sampling of a metropolitan population.

An economic model was developed to assess the socioeconomic characteristics influencing the demand for water-oriented outdoor recreation in the St-Louis area. The variables considered were assumed to have a significant influence on the demand for water-oriented outdoor recreation. For this reason, all variables were considered in a first phase of the analysis. Using the "t" test for the b value of each variable, the variables not found to be significant is different from a second were dropped and an

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[10]G. A. Gillespie and Durward Brewer, An Econometric Model for Predicting Water-Oriented Outdoor Recreation Demand (Missouri: Agricultural Experiment Station, Dept. of Agricultural Economics, University of Missouri, 1969).

additional computer run was made considering only the significant socioeconomic characteristics. Factors found to be most significant were: annual family income, education, sex, race, age and occupation. Covariance analysis was used to isolate the influence of each specific factor or characteristic for this type of recreation. This model gives an estimation of the number of recreation days produced by a specific origin area.

Based on the procedure outlined above, McCoy[11] attempted to establish a relationship between certain socioeconomic factors of households in a specific population and the intensity of use of outdoor recreation by the members of each household within the same area. He utilized a stepwise regression analysis where, at each step, one variable is added to the regression equation.

Least squares procedures have been used in order to determine the values of regression coefficients. The resulting coefficients may be employed to estimate future participation when the values of the independent variables were estimated for target years, if certain assumptions are maintained.

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[11]E. W. McCoy, "Analysis of the Utilization of Outdoor Recreation in Tennessee" (unpublished Ph.D. Thesis, University of Tennessee, Dept. of Agricultural Economics, 1966).

A different approach was used by Cicchitti *et al*.[12] in an econometric analysis where they provided an empirical model of the demand and supply factors for various outdoor recreational activities.

According to the authors, in order to estimate future demand for outdoor recreation activities, the use of a single equation which does not take into account the supply characteristics of the market can only be successful if the market is one where supply can vary with demand. This means that if demand increases for different reasons such as increase in income, population, etc., supply changes and adapts itself to changing conditions. In this manner, within a relatively short period of time, a new equilibrium can be reached between supply and demand.

The authors suggest that supply changes might be followed by demand changes in a fashion known as recursive structure. In such cases, the quantity demanded during one specific year (T) is a function of the quantity supplied during the preceding year (T-1). The model used in their study is a disaggregated demand and supply model for one specific individual in a definite time period.

The technique utilized in Cicchitti's model is straight-forward. The underlying population was divided

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[12]Charles J. Cicchitti, Joseph J. Seneca and Paul Davidson, *The Demand and Supply of Outdoor Recreation* (New Brunswick: Bureau of Economic Research, Rutgers, The State University, 1969).

into groups or classes based on such key socioeconomic characteristics as race and age. Each population subgroup was isolated for forecasting and simulation purposes. Projections have been developed for each class for any given year, and these projections have been aggregated to provide forecasts for the given year.

A more global approach was used in 1962 by the ORRRC.[13]

A separate projection was prepared for each recreation activity for which current participation rates were available within socioeconomic subclasses of the population. The gross effects, from 1960 to target dates, on participation rates of each socioeconomic factor were estimated by reweighting the 1960 rates according to a projected distribution for each of five factors: family income, education, occupation, place of residence and age-sex. In order to remove the multicollinearity effect between independent socioeconomic variables, a multivariate analysis was used.

The composite result of all factors acting together was then estimated from the net effects mentioned above to give a series of projected rates of participation by the population in any activity.

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[13]Outdoor Recreation Resource Review Commission, Report No. 26, op.cit., p. 11.

The Site-Oriented Models

Some models have been developed to estimate and predict demand for different specific recreation sites. In such models, only variables which characterize the recreation site are used.

Some authors used a gravity model in order to estimate the demand for outdoor recreation. Such a model draws on the concept of population potential developed by Stewart.[14] It is based on the principle that any population concentration exerts an influence that varies directly with its size. However, as explained by Richardson,[15] this influence is reduced by distance, a force field surrounds each population cluster and, at any point within the field, its intensity can be measured by dividing the size of the population by distance.

Wennergren and Nielson[16] formulated a probabilistic model and established a technique to estimate usage of recreation sites. The only two variables used in this model are distance and size of the site. From this simple

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[14] J. Q. Stewart, "Empirical Mathematical Rules Concerning the Distribution and Equilibrium of Population," The Geographical Review, 37 (1947).

[15] Harry W. Richardson, Regional Economics (New York: Praeger Publishers, 1969), p. 39.

[16] Boyd E. Wennergren and Darwin B. Nielson, "Probability Estimates of Recreation Demands," Journal of Leisure Research, 11 (1970).

model, the authors attempts to formulate probabilities of use by recreationists coming from various points of origin.

Wennergren and Nielson started with the basic hypothesis that the utility-generating ability of a recreation area is inversely related to the distance between the site and the place of residence of the users. A second hypothesis used is that the size of a recreation area can be an important datum because it is assumed that the utility generated by a recreationist increases with the size of the area.

In the case of a boating recreation area, the authors developed the following equation:

$$P_{ik} = \frac{S_k^a / D_{ik}^{\ b}}{\sum_{K=1}^{n} S_k^a / D_{ik}^{\ b}}$$

where:

P_{ik} = Probable number of visits to a boating site (i) from a given origin area (k)

S_k = Surface area of the k^{th} boating site

D_{ik} = Distance from the i^{th} origin to the k^{th} boating site

a = A parameter which reflects the effect of the size of the area of the site on the number of trips to the site

b = A parameter which reflects the effect of the distance on the number of trips to the site.

In the above equation, the use of only two characteristics to reflect the boaters' utilization of a given site greatly simplifies its application. The least that we can say of the above technique is that it is far from being realistic if applied to a real world situation.

A different approach was tried by Carlton S. Van Doren. In this study the author was interested in designing a suitable method for projecting attendance of campers at the Michigan State Parks. Three steps are included in the procedure. The first step consisted in classifying each state park in terms of its attraction as a trip destination. This was expressed in terms of attraction indices. A second step uses regression analysis to evaluate the relationship between attendance at the park (camper-days) and the attraction indices.

The third step consisted in building a gravity model in which the components are the attraction indices and the number of camper-days produced in the 59 park destinations by users from the 88 origin areas.

According to Van Doren, this travel model can be used as a predictive tool for estimating use of existing

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[17] C. S. Van Doren, "An Interaction Travel Model for Projecting Attendance of Campers at Michigan State Parks: A Study in Recreational Geography," (Unpublished Ph.D. Thesis, Michigan State University, 1967).

or proposed recreational sites. However, even if the attraction index is a very important independent variable, and possibly the only one, a model based almost solely on this variable is very incomplete, since it does not take into account variables such as the socioeconomic factors, etc. Another problem with Van Doren's approach is that he restricted his variables to those only that are within the limits of the campground or to the campground characteristics.

Crampon[18] used such a model as a tool to estimate the number of persons likely to visit any specific destination from any point of origin and also to determine the significance of certain characteristics of these visitors.

The concept on which Crampon's model is based is that a specific and measurable relationship does exist between the visitors from a specific point of origin who are attracted by a given recreation area; this number of visitors is taken as the dependent variable.

In Crampon's model, the independent variables used are:

1) the magnitude of the population of a market (origin area) and
2) the distance between the distination and that market.

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[18] L. J. Crampon, "A New Technique to Analyze Tourist Markets," Journal of Marketing, 30, (April 1966), pp. 27-31.

The relationship between these variables can be expressed by the following equation:

$$V_{od} = b\ P_o\ T_{od}$$

where:

V_{od} = The number of visitors from a given market area (o) visiting a given destination (d)

P_o = The population of the market (o)

T_{od} = The travel distance between (o) and (d)

b = A constant

This model was applied to all the states in the United States, including the District of Columbia. Each of these were considered as possible origin and destination areas for all the other states.

It must be remembered, however, that a model which considers only the population of an origin area and the distance between this area and the destination leaves much to be desired, since it is assumed that there are no significant differences in the tastes, incomes and age distributions, etc., within a population of a given market area.

J. B. Ellis[19] constructed a model which simulates recreational travel on the highways of Ontario. In this

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[19] J. B. Ellis, A System Model for Recreational Travel in Ontario, Report No. R.R. 126 (Toronto: Ontario Department of Highway, 1967).

model, the author includes independent variables related to the origin area as well as to the destination area.

The method used by Ellis for modeling recreational travel as a system is based on the segregation of the province into three classes of components: (1) A set of origin areas, (2) A set of highway link components, (3) A set of destination areas.

Each component is modeled by means of the following equation.

$$Y_{hj} = G_j X_{hj}$$

X_{hj} = The propensity to camp at a particular campground, of an origin area.

Y_{hj} = The flow or attendance of campers in each component, measured on a full season basis.

G_j = $\frac{1}{c+t}$ as the demand for a campground is inversely proportional to the out of pocket cost and time of travel.

It could then be possible to reformulate the above equation as:

$$Y_{hj} = \frac{X_{hj}}{c + t}$$

In this systems model, from each origin area there is a very large number of paths, all presenting an individual resistance which is increased by a lengthy trip and decreased by an attractive destination. Highway users are postulated to distribute themselves over the system on a basis of decreasing flow with increasing resistance.

The method of combining the above equations, one for each component in the system, is based upon linear graph methods.

However, since no socioeconomic variables are included in the model, it is impossible to take into account the influence of the variations of these different variables. Ellis therefore assumes that there is no difference between the socioeconomic characteristics of different origin areas.

CHAPTER II

STATISTICAL MODEL FOR PREDICTING THE DEMAND FOR AMONG RESIDENTS OF STE-FOY

At present, the Quebec Department of Tourism, Fish and Game is actively engaged in planning and operating extensive programs concerning the development, conservation and preservation of land and water resources. Many of these programs and projects include the development of recreation facilities for the public.

So that it be possible to achieve an adequate economic feasibility analysis intended to serve in the overall planning of the development of recreation projects, it is necessary that, in all provincial recreation areas, the number of annual recreation-days be determined. In this study, the main objective is to estimate present as well as future outdoor recreation demand in the Province of Quebec.

In order to obtain all the information required for the feasibility analysis mentioned above, it was decided to build a regression analysis model which would use, as basic data, the responses obtained from a questionnaire addressed to some 1800 heads of households located in the town of Sainte-Foy, a suburb of Quebec City.

The method and the questionnaire used during this survey will be described in detail below. Let us say for the moment that each individual interviewed (through the questionnaire) gave all pertinent data related to the socioeconomic factors concerning his particular household. When compiling the data obtained during this first survey, it was discovered that the number of citizens of Sainte-Foy who did not engage in any outdoor or camping activities was so great, and their ratio in relation to the total number of persons interviewed was so high, that the analysis could not possibly bring out some very important points that we considered essential to obtain significant results in our analysis. For instance, when we used the least squares method in order to estimate the different regression coefficients b_1 to b_x it was found that the coefficient of multiple determination (R^2) had a value of 0.075 which is much too low to give any confidence in the projection.

It is, however, possible to determine the subpopulation of individual recreation users and which variables influenced the degree of participation and also, to indicate whether its participation tends to increase or decrease. It would be of interest to planners if one could predict what type of individuals will participate in the various outdoor recreation activities.

In order to complement the first analysis and achieve the objectives that we had set forth to reach in the present study, a second analysis was undertaken which used an entirely different approach and yielded the desired results.

In the two following chapters we will explain in detail how these two models were developed.

Origin Area

Sainte-Foy, a city of 9,420 households, a suburb of Quebec City, was selected as the typical origin area or study unit for the present survey. Sainte-Foy is a white-collar middle-class town containing few industries.

Size of Sample and Method of Sampling

The method used consists in selecting every fifth family from a list[1] of all the households in the city of Sainte-Foy. The sample thus obtained comprises 1,804 sampling units or households representing 20% of the 9,420 households in the city. A questionnaire was mailed to the head of every family thus selected.

The sample was designed to be large enough to give confidence that the regression line obtained from the sample is similar to the "true" regression line which would be obtained from the entire population. It was felt that a larger sample would probably have given additional

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[1] Annuaire Marcotte de Québec (Québec: R. L. Polk and Co., Ltd, 1971).

precision to the results but its cost would have reached far beyond the resources put at the disposal of the author. The first returns of the questionnaire represented 41% of the households contacted; a subsequent series of questionnaires sent to those who had not answered the first time raised the proportion of replies to a total return of 48%.

The Variables

Two types of variables must be considered in the present study: 1) the independent variables which are the characteristics attached to each individual household head such as his occupation, his age, his salary, etc., and 2) the dependent variables which, in the present study, will be expressed in terms of number of camping days per household for different types of camping. In the present study, data for three different dependent variables were collected. These are:

1- Number of camping days in the province of Quebec.

2- Number of camping days in provincial campgrounds in Quebec.

3- Number of camping days in six selected campgrounds located in the vicinity of Quebec City: Mare du Sault, Stoneham, Villeneuve, Ile d' Orléans, Montmagny and Beaumont.

The questionnaire was prepared in such a way that we would obtain the maximum amount of data on the socioeconomic conditions of the population. Most of these variables can be considered as factors which can influence demand for outdoor recreation. It is understandable, as we have seen in the introduction, that these factors could be so numerous that it would be too expensive and too difficult to answer a questionnaire that would attempt to include all of them. Furthermore, the multiplicity of the answers would give so many variables that an adequate proper analysis would not be possible. For the reasons mentioned above, it was felt most important to keep the questionnaire as short and as concise as possible. In order to achieve this, it was decided to obtain only information believed to be of prime importance. The basis on which such variables were selected was mainly the author's own judgment and, also, studies which have been conducted by various authors. Amongst these we can mention: The Outdoor Recreation Resource Review Commission[2] study, Cicchitti's study on the demand and supply for Outdoor Recreation[3] and McCoy's study of Recreation in Tennessee.[4]

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[2]Outdoor Recreation Resource Review Commission, Report No. 26, <u>op.cit</u>., p. 16.

[3]Cicchitti, <u>op.cit</u>., p. 97.

[4]Edward Wayne McCoy, "Analysis of the Utilization of Outdoor Recreation in Tennessee," (Unpublished Ph.D. Thesis, University of Tennessee, August 1966), p. 25.

This process automatically reduced the number of variables to those listed below:

1- Age of head of household

2- Education level of head of household

3- Household income level

4- Number of children in household

5- Occupation of head of household

The first four of these independent variables are continuous variables because they can be easily measured with an interval of higher scale, whereas the fifth one, which describes the occupation of the head of the household, must be considered a nominal scale. These classes have been used in collecting data mostly for practical reasons in order to make the questionnaire easy to answer. As an example of a continuous variable we can see below how the household income can be measured.

Income:

$1,999. or less

$2,000. to $3,999.

$4,000. to $6,999.

$7,000. to $10,999.

$11,000. to $15,999.

$16,000. or more

On the other hand, there is absolutely no basis on which we could rate on an interval scale an individual employed in the public service and another one employed in the construction industry; we are therefore using a nominal scale.

Discontinuous Independent Variables

For the purpose of the present study, the occupational variable (a dummy variable) is assigned a value by using the following procedure: the occupation factor has been subdivided into ten different groups corresponding to the divisions used by the Dominion Bureau of Statistics. It was important to use such a classification, in order to obtain from that government bureau the estimates of the future disttribution of workers by occupations. These groups are listed below:

- Employed in primary industry
- Employed in finished products industry
- Employed in the public service
- Employed as office worker
- Professional
- Artist
- Employed in the construction industry
- Machine operator
- Student
- Retired.

For any individual head of a household, the value of his occupation is given the value of one in the table set up for the regression analysis. The only exception is for people classified as retired (group 10) whose occupation is given a value of zero. The selection of this group, to be given a value of zero, is purely empirical and any other of the 10 groups could have been assigned this value of zero which is needed as a basis for comparison with the other occupations in the course of the regression analysis procedure.

When setting up the matrix with the data obtained from the questionnaire and to be used as matrix data in the regression analysis, each individual head of household has a classification of one opposite his name in the vertical column corresponding to his occupation. In all other vertical columns corresponding to occupations other than his own, the figure zero is inscribed as seen in the table below. We can observe, in the same table, that to conform with what was said above, only zero appears in all the occupational vertical columns opposite the names of retired heads of households.

The regression coefficients associated with the occupation variable other than that of the retired head of the household indicate the deviations of all the other occupation intercepts from this zero base. For example if the model is used to estimate annual camping days for a family in which the head of the household is retired, the occupation variable in this case would have a value of zero and it would drop out of the system so that no occupation parameters would enter into the equation for this particular group of individuals. The effect of the

TABLE 1

Representation of Dummy Variables in the Model Used

Variables:	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
Observation										
1 - Household (professional)	0	0	0	1	0	0	0	0	0	0
2 - Household (artist)	0	0	0	0	0	1	0	0	0	0
3 - Household (public servant)	0	0	0	0	1	0	0	0	0	0
4 - Household (retired)	0	0	0	0	0	0	0	0	0	0
⋮ ⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
693 - Household (professional)	0	0	0	1	0	0	0	0	0	0

retired class appears in the constant term. If the model is used to estimate annual camping days for a family in which the head of the household is a professional, the occupation variable in this case would have a value of one and the parameter b_5 which would be determined for this occupation would be added to the value of a. It would then be entered as:

$$Y = a + b_5 \ (1)$$

or

$$Y = a + b_5$$

where

b_5 = parameter determined for the professional class.

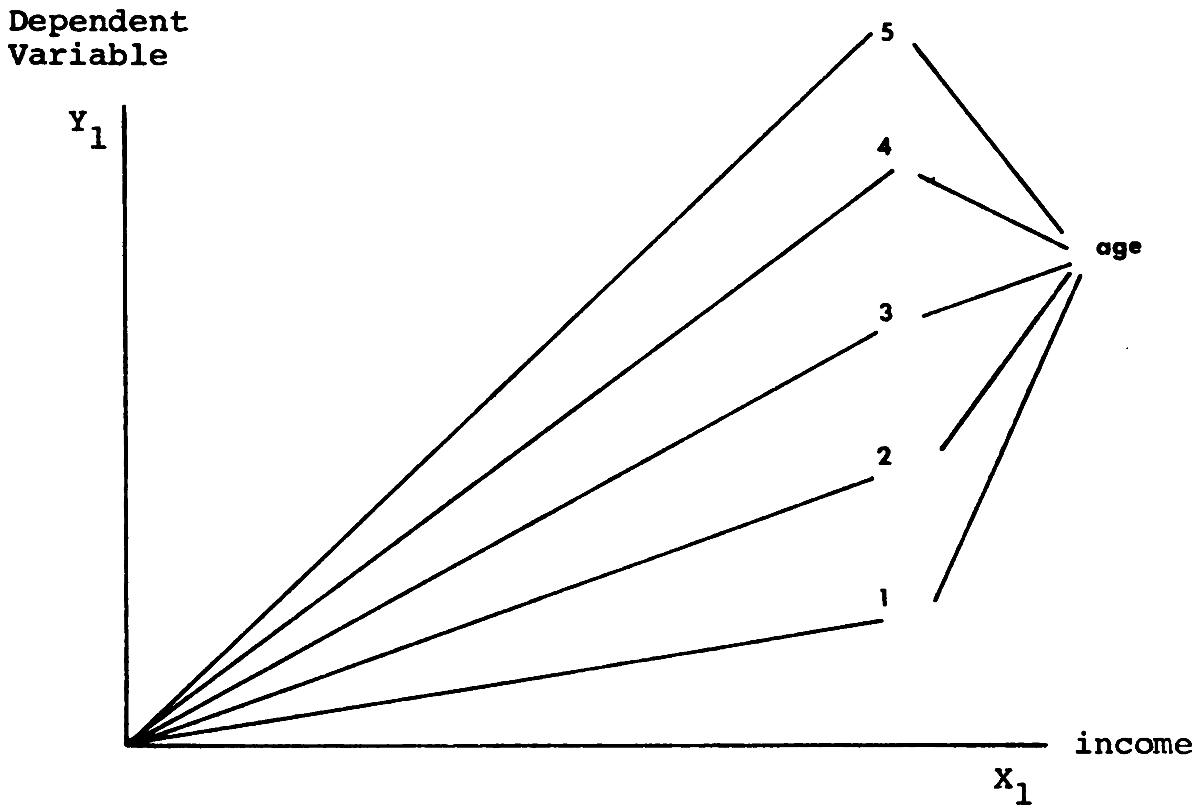
<u>Independent Cross Variables</u>

It is a known fact that some independent variables interact with one another and that the resulting joint effect influences the behavior of the dependent variables in a different way than would do so each of the individual independent variables. For this reason it was decided to introduce other variables as cross variables.

The following figure illustrates how one independent variable can affect any number of other independent variables through a phenomenon of interaction which gives a resulting cross product as explained below:

FIGURE 2

Cross Variables



In the above diagram, the effect of income X_1 on the dependent variable Y_1 is not only a function of the actual income of the different groups of people that form the population of a city, but also a function of the age of those people.

Hence, it is evident that independent variables cannot always be used as such without due account being taken of the effects that one variable can have on other variables. In other words, in a regression analysis of these data, the effects of those variables cannot be considered as simple values and added to one another because they are not additive. To illustrate this point, let us consider that in the above figure the annual income of the family and the age of the head of the household have been introduced as cross variables. If the coefficient of this cross variable is significant, it means that the effect of one of these two social characteristics is itself a function of the value obtained with the other characteristic.

If we consider the relation existing between age and income, it is evident that the same income has different effects on the dependent variable according to the age of the individual.

In the present study, the variables introduced as cross variables are: (1) age of head of household; (2) household income; (3) number of children in household.

The above three variables are expressed by:

1) $X_1 \quad X_3$

2) $X_3 \quad X_4$

3) $X_1 \quad X_3 \quad X_4$

where:

X_1 = Age of head of household

X_3 = Household income level

X_4 = Number of children in household

Quadratic Variables

After computer processing the available data, we expect to obtain a series of curves which we know to be curvilinear from previous experience. In order to facilitate processing, it was assumed that some variables do not have linear relationship with the dependent variable; therefore, the variables are introduced in both regular and quadratic form:

$$Y = a + b_1 X_1 + c_1 X_1^2$$

in which Y = The number of visitors from a specific population center, a = The value of the Y coordinate at the point of intersection of the curve and the Y axis, b_1 = The slope of the curve at this point, and c_1 = sign that indicates direction and the degree of curvature of the curve. Theoretically the value of "a" should correspond to the point of origin (coordinate 0-0) of the curve. In fact, it is always above the point of origin, due to some variables which are not included in the statistical model.

In the present study we have introduced, in quadratic form, the four following variables:

X_1 = age of head of household

X_2 = education level of head of household

X_3 = income level of household

X_4 = number of children in household

The Model

To analyze the collected data, a multiple-regression model is used. Such a model measures the simultaneous influence of a number of independent variables upon one dependent variable, and describes the average relationship between these variables; this relationship is used to predict values for the dependent variables.

As seen in the above section, the variables are introduced into the regression analysis model as: simple variables, quadratic variables, and cross variables. The resulting equation has therefore, the following form:

$$Y = a + \sum_{i=1}^{21} b_i \; X_i \qquad i = 1, \ldots\ldots, 21$$

in which

Y = number of camping days

b_i = partial regression coefficients

X_1 = age of head of household

X_2 = education level of head of household

X_3 = household income level

X_4 = number of children in household

X_5 = 1 if employed in primary industry,
0 otherwise.

X_6 = 1 if employed in finished product industry,
0 otherwise.

X_7 = 1 if employed in public service
0 otherwise.

X_8 = 1 if employed in office work

0 otherwise.

X_9 = 1 if professional

0 otherwise.

X_{10} = 1 if arts

0 otherwise.

X_{11} = 1 if employed in construction industry

0 otherwise.

X_{12} = 1 if employed as machine operator

0 otherwise.

X_{13} = 1 if student

0 otherwise.

X_{14} = 1 if retired

0 otherwise

$X_{15} \ldots X_{18}$ = Quadratic variables

$X_{19} \ldots X_{21}$ = Cross variables

Level of Significance

After carefully examining research of other authors in the field of recreation and appropriate areas, it is believed that with the present type of study, a level of significance of 0.1 is appropriate, hence one may accept the risk of being wrong 10% of the time. Little[5] and McCoy[6] in two studies of the same kind, have also used a level of significance of 0.1. So in the present study the significance of the independent variables at a level of 0.1 is thus specified.

Analysis of Data

The S.P.S.S. multiple-regression analysis computer program[7] was used to estimate the regression coefficients. The S.P.S.S. mutliple regression analysis is a computer program with automatic stepwise addition of variables to form a least squares equation. This program provides a means of choosing independent variables which will lead to the best possible prediction with the fewest independent variables. Through the use of this stepwise-regression analysis, an independent variable is chosen at each stage amongst all the independent variables which are not included in the equation. In this way, at every stage of the

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[5]A. D. Little, A Study of Factor Affecting Pleasure Travel to U.S., Report to the U.S. Travel Service (Washington, D.C.: U.S. Department of Commerce, 1967), p. 198.

[6]E. W. McCoy, "Analysis of the Utilization of Outdoor in Tennessee," op.cit., p. 39.

[7]Norman H. Nie, Dale H. Bent and C. Hadlai Hull, Statistical Package for the Social Sciences (New York: McGraw Hill Book Company, 1970), pp. 208-244.

analysis, the variables of the preceding stage are reexamined. The independent variable selected is the one which will reduce to the greatest extent the unexplained variance around the mean of the dependent variable. It follows, therefore, that the selected independent variable is also the one which will raise to the greatest extent the coefficient of multiple determination.

In the present study, with the data obtained in the 693 completed questionnaires submitted by households of Sainte-Foy, the regression model was tried for the dependent variable. All the variables listed above were assumed to have a significant influence on the demand for camping and were included in the models. In every case the value of the coefficient of multiple determination (R^2) was found to be much too small to be of any practical significance and leads one to conclude that the selected independent variables account for very little variability of the dependent variables. Such surprising results led us to make a very careful study of the whole procedure in order to find out what caused this model, carefully elaborated, to be of so little practical value in this particular analysis.

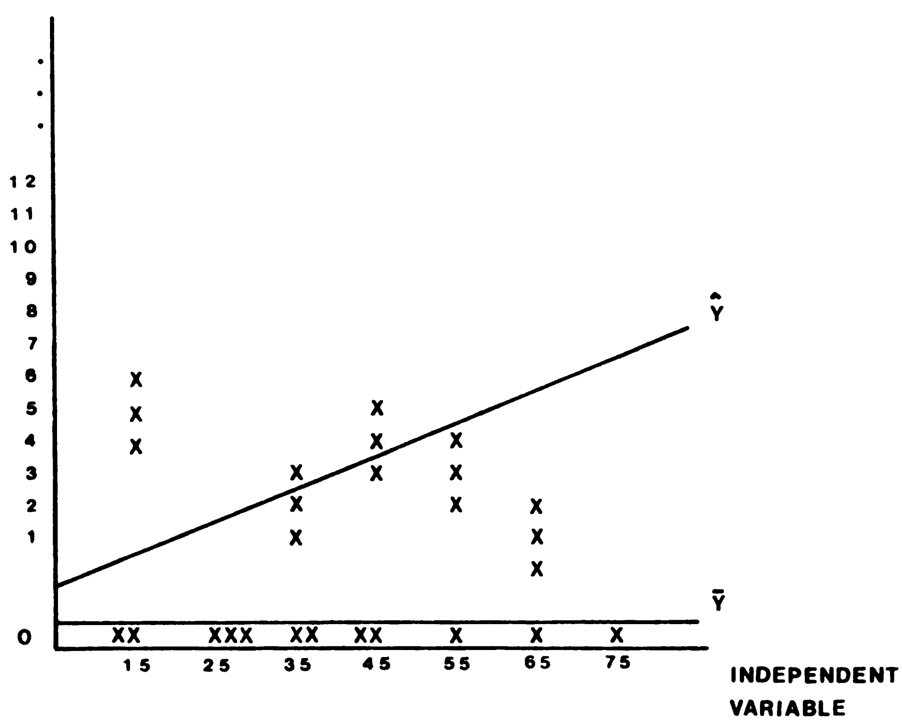
It seems at first sight that the main difficulty is due to the fact that a very large proportion of the population interviewed through the questionnaire did not participate in camping in any way. Therefore we may conclude that in the city of Sainte-Foy, since the majority of the people have a dependent variable of zero or near zero, the value of R^2 cannot possibly be high enough to make prediction on the future use of campgrounds.

In the survey made in Sainte-Foy, out of 693 households who answered the questionnaire, 516 did not camp during the summer of 1972. The survey yielded a participation mean of .78 camping-day per household.

The following (Figure 3) also explains the basis of the coefficient of multiple determination. In this case, however, it is adapted to the particular case where a great proportion of the individual observations has 0 as value for the dependent variable (camping nights).

FIGURE 3

Basic Measures for Coefficient of Determination When a Great Proportion of Observations are non Participants



The R^2, which is the explained variance divided by total variance around the mean thus obtained, is very small.

It was believed that further interpretations of the data obtained can bring some very interesting information. It does not seem possible to predict whether an individual will participate or not in the camping activity; consequently, having determined the subpopulation of individual campground users, it was proposed to determine which variables influenced the degree of participation and whether the entire recreation activity tends to increase or decrease. It would be interesting if one could predict which individuals are likely to participate in various outdoor recreation activities, but since this seems impossible, it seems promising to compare the difference between the participating and non-participating individuals for the different variables.

In the following analysis the "t" test is applied to the interval-scale variables. In such case the null hypothesis is that $\bar{X}_1 = \bar{X}_2$, where $\bar{X}_1$ is the mean value of the participants and that $\bar{X}_2$ is the mean value of the non-participants.

The chi-square test is commonly used for testing nominal scale variables. This test is used to verify the hypothesis that the means or relative frequencies of the K population means are not significantly different. In this analysis a contingency table is constructed in order to test the hypothesis that there is no relationship between the individuals' occupation and their participation in camping.

Table 2 gives the t values and the direction of effect for the mean differences between campers and non-campers.

TABLE 2

Mean Comparisons Between Campers and Non-Campers Subsamples

Variables	Campers		Non-Campers		t	
	$\bar{X}$	s^2	$\bar{X}$	s^2		
Age	41.452	75.386	44.229	93.882	-	3.4
Education	5.678	4.379	5.729	4.35	-	.28
Income	13.160	1.650	13.700	1.920	-	44.77
Number of children	3.492	2.688	3.461	2.195	+	1.526

From the survey made in the city of Sainte-Foy, we know that there are 177 campers and 516 non-campers. With a level of significance of 0.1 the critical value of 1.64 is used. The t test leads to the conclusion that there is not sufficient evidence to indicate a relationship between the degree of participation and the number of children or the level of education of the participants.

The following table was constructed to verify the hypothesis that there is no relationship between individuals' occupations and participation in camping activities.

TABLE 3

Camping Participation

	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	X_{13}	X_{14}	TOTAL
Camping	3	13	22	33	90	4	2	3	1	5	176
Non-Camping	7	20	52	69	263	6	14	13	1	74	519
TOTAL	10	33	74	102	353	10	16	16	2	79	695

where

X_5 = Employed in primary industry

X_6 = Employed in finished products

X_7 = Employed in public service

X_8 = Employed in office work

X_9 = Professional

X_{10} = Arts

X_{11} = Employed in construction industry

X_{12} = Employed as machine operator

X_{13} = Student

X_{14} = Retired

The critical value of χ^2 for α = .10 and 9 degrees of freedom is 14.684; hence, because of the magnitude of χ^2, 25.86, the hypothesis that the mean degree of participation is equal for all the k occupations is rejected. This leads to the conclusion that the frequencies of participation differ by occupation.

It was then decided by a trial and error process to group together occupations which did not show any difference in the rate of participation and to sort out the occupations which did show a difference. It was first decided to eliminate five of the occupations because of the small number of individuals belonging to these groups. These are X_5, X_{10}, X_{11}, X_{12} and X_{13}. After many trials, the chi-square test showed no difference between X_6, X_7, X_8 and X_9 (see Table 4) and as a result X_{14} is sorted out as the only one with a significantly different rate of participation.

TABLE 4

Camping Participation

	X_6	X_7	X_8	X_9	TOTAL
Campers	13	22	33	90	158
Non-campers	20	52	69	263	404
TOTAL	33	74	102	353	562

$\chi^2 = 4.35$

The critical value of χ^2 for $\alpha = .10$ with 3 degrees of freedom is 6.251, therefore, because of the magnitude of

4.35, the hypothesis that the relative frequencies of participation of the k occupation are equal is accepted and the conclusion is that the frequency of participation does not differ significantly among the four occupations. However, when the tenth occupation X_{14} is entered into the test, the χ^2 obtained falls into the rejection region.

For more sensitivity, it was then decided to aggregate X_6 X_7 X_8 and X_9 and to test against X_{14}.

TABLE 5

Camping Participation

	X_6 X_7 X_8 X_9	X_{14}	TOTAL
Camping	158	5	163
Non-camping	404	74	478
TOTAL	562	79	641

$\chi^2 = 67.50$

The critical value of χ^2 for $\alpha = .10$ with 1 degree of freedom is 2.706, therefore because of the magnitude of 67.50, the hypothesis of an equal participation is rejected.

The above analysis tends to indicate that a young population with lower income and a larger family produces a larger number of campers, whereas non-campers belong to the older population with a higher income and smaller families. The analysis of the binominal variables, using the chi-square method, further indicates that there would be no significant difference between the rate of participation of people with different occupations, except for retired people who show a clear tendency toward a lower participation.

CHAPTER III

STATISTICAL MODEL FOR PREDICTING THE DEMAND FOR CAMPING AT VARIOUS PROVINCIAL PARKS

Following the completion of the first study, it was felt that positive results were needed in order to obtain some valuable projections on the future demand for campgrounds in the Province of Quebec. For this reason, a second study was undertaken in which groups of individuals were used as observation units instead of individual households, such as suggested by Cheung[1] and Grubb and Goodwin.[2] In so doing it was expected that any group of individuals, such as those represented by the population of a county or of any other geographic unit, should have much greater stability than individuals. It is indeed most likely that each of these groups will send at least a few visitors to the campgrounds each year.

In this second model, the observation units selected are the counties of origin of the citizens travelling to the

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[1] H. K. Cheung, A Day-Use Park Visitation Model, Report to the Canadian Outdoor Recreation Study Committee (Ottawa: Department of Indian Affairs and Northern Development, 1970).

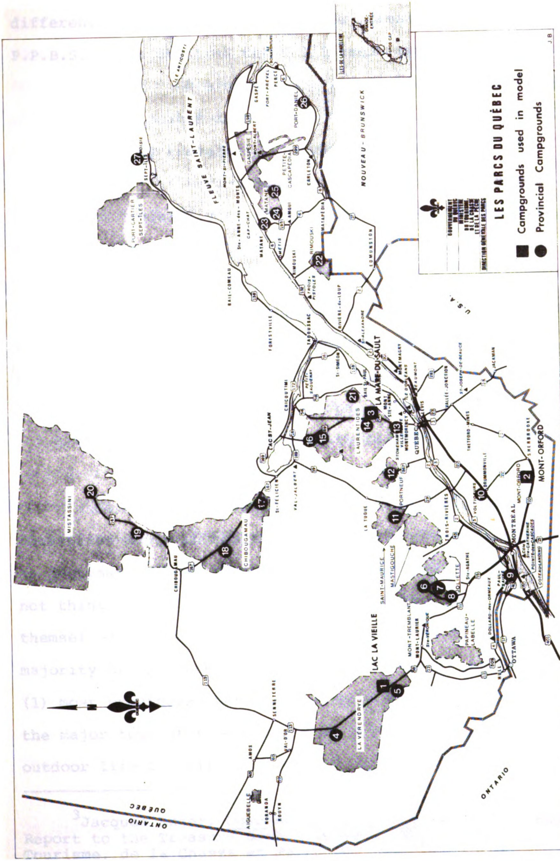
[2] H. W. Grubb and J. T. Goodwin, Economic Evaluation of Water-Oriented Recreation, Report No. 84 (Texas: Agricultural Experiment Station, 1968).

campgrounds; the independent variables are the calculated average of the socioeconomic characteristics of all the residents of any such county of origin. There are other variables which are also included in this model, such as the distance between the origin and destination points, and others which will be described in a later part of the present study.

In this model the dependent variable (the number of camping nights) is calculated by adding, for a definite period of time, the number of visitor/days that are recorded at a given campground and which originate from the different counties of the Province. Let us assume that during a sampling period of 14 days, campground A, is visited by X persons from a particular county. Since some of the visitors remain at the site for more than one night, the total number of camping nights for these people will be greater than X. The same thing is bound to happen for almost any other county in the province.

It was possible to obtain the data described above for the three following provincial campgrounds: (1) La Mare du Sault, in Laurentides Park; (2) Lac La Vieille and (3) the Mont Orford Park (see Map No. 1 for location).

All of these campgrounds have been defined in the framework of the P.P.B.S. system as destination campgrounds. The Department of Tourism, Fish and Game, in describing the



Names of campgrounds in annex no.4

different programs comprised in the framework of the P.P.B.S.,[3] has utilized three different types of campgrounds:

1 - Overnight campgrounds, that are usually located along major highways and mostly used by travelers for only one night.

2 - Peri-urban campgrounds located in the vicinity of urban areas. These are usually a supplement to the urban-oriented recreation facilities.

3 - Destination campgrounds; most campgrounds of this type are located within the large provincial parks and usually have a supplemental function to the park itself. Most campgrounds of this third group are resource-oriented.

We cannot be absolutely sure that the campgrounds classified above in the third group are used exclusively as destination recreation area by all visitors. Yet we do not think that it is presumptuous to assume that the parks themselves are used as destination areas by the great majority of the park users for the following reasons: (1) most provincial parks are located some distance from the major tourist roads; (2) most provincial parks offer outdoor life facilities of a very high standard and of

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[3]Jacques Auger, Dossier Préliminaire des Programmes, Report to the Treasury Board (Quebec: Ministère du Tourisme, de la Chasse et de la Pêche, 1972), p. 49.

great diversity. (For instance, we know that in these parks, fishing and hunting are among the best in North America. Rivers of very good quality for canoeing are present in all the parks and there are many other types of activities available to resource-oriented visitors of the parks); (3) the Province of Quebec is so large and the provincial parks so widely spaced that it is difficult for a visitor to make a tour of these recreation areas.

The above-mentioned reasons make the campgrounds located within provincial parks quite different from overnight campgrounds which are always located very close to important tourist roads and which have very little to offer, except overnight facilities. These overnight campgrounds have more or less hotel accommodations and they cannot be considered as attractive by themselves, but they are usually located along the roads going to attractive centers such as Montmagny, Beaumont, etc.

The previous map shows with different shapes the location of the various types of campgrounds located within the boundaries of the Province of Quebec, as well as the three campgrounds which are studied in the present research study.

The Variables

The provincial park authorities have collected data on the number of people from various points of origin who visited the different parks during a two-week survey period in 1971. Taken along, these do not yield the information needed for an economic evaluation of the campgrounds. However, these data are important and must be evaluated in economic terms in order to estimate the recreational benefits of the campgrounds considered in this study. The cost of travel and the acquisition of recreational equipment as well as the rental of all necessary services are the major costs incurred by park users. The fact that the consumer allocates a portion of his income to the use of recreation facilities means that these activities have an economic value for this consumer.

The demand curve for any specific good or facility is defined by Samuelson as follows: ". . . there exists at any one time a definite relationship between the market price of a good and the quantity demanded of that good. The relationship between price and quantity bought is called the "demand curve."[4]

If in the above-mentioned relationship the price of a good is changed, the quantity demanded will change. However, it is possible to shift the entire demand curve by introducing a variation in different characteristics such as income, market structure, or simply a change in the desire of the people to spend their money on a particular good. Such a change in demand means that

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[4]Paul Samuelson, Economics: An Introductory Analysis (New York: McGraw-Hill Co., 1967), p. 66.

different quantities will now be bought at the same price.

It is believed that each of the factors listed in the first chapter of the present study might affect in one way or another the demand in any particular outdoor recreation area.

Unfortunately it was found to be very difficult, or in some cases impossible, to gather data bearing on some of the variables. Therefore, for the purpose of the present study some of those less important factors used in the first study had to be eliminated. The author had to be satisfied with only those variables that were available from the statistics at hand and which are shown in the general form of the visit-estimating equation shown below.

$$Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7$$

in which

Y = number of visitor/days from a particular county of origin.

a = intercept

b_i = partial regression coefficients

X_1 = population of the county of origin of the visitors

X_2 = per capita income in the county of origin of the visitors

X_3 = round trip cost from the county of origin to the campground, in dollars

X_4 = average age of the heads of households in the origin county

X_5 = average age of the inhabitant in the origin county

X_6 = degree of urbanization of the origin county

X_7 = substitution effect variable which reflects the competitive effect of other campgrounds located near the origin area.[5]

The Data

For the present study, it was decided to use the county as the observation unit, because this geographic entity is the basis for all statistics available and thus gives us a chance to estimate the influence of the above-mentioned variables upon the number of visitors to campgrounds. As mentioned above, data for these variables were most readily available on a county basis. In some cases, the campgrounds did not receive any visitors from certain counties during the two-week period used for the present survey. However, these counties could not be ignored since they each represent a potential supply of visitors. Such origin areas were entered into the analysis with a zero value for the dependent variable.

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[5]This variable will be dealt with extensively in a later part of the present study (p. 67).

In order to have information on the number of visitors from each county, the author was provided access to data collected during the summer of 1971 by the Provincial Parks Service. Each party entering the provincial campgrounds was requested to complete the form shown below.

FORM USED BY THE PROVINCIAL
PARKS SERVICE DURING THE SUMMER OF 1971

GOUVERNEMENT DU QUEBEC
MINISTERE DU TOURISME, DE LA CHASSE ET DE LA PECHE
DIRECTION GENERALE DES PARCS

CAMPING N°

DOMICILE – RESIDENCE

MAR. ☐ QUE. ☐ ONT. ☐ OUEST. ☐ USA. ☐ AUTRE ☐

EQUIPEMENT – EQUIPMENT

TENTE / TENT ☐ ROULOTTE / TRAILER ☐ TENTE-ROU. / TRAILER-TENT ☐

PERSONNES – PERSONS ☐

DUREE DU SEJOUR – LENGTH OF STAY ☐

ENTREE – IN ______ SORTIE – OUT ______

NOM – NAME

ADRESSE – ADDRESS VILLE – CITY

COMTE – COUNTY PROVINCE ETAT – STATE

IMMATRICULATION – CAR REGISTRATION

SEJOUR – STAY ☐ X ___ = $ ______

SERVICES ☐ DAYS X ___ = $ ______

SITE N° ______ TOTAL $ ______

Each form indicates the county of origin of each group of visitors, the number of persons in the group and the number of nights that each person spends in the park. From the data thus collected, it was possible to obtain the number of visitors per day from each county of origin.

The compilation was made for a sample period of two weeks (the first week of July and the first week of August) for each of the three campgrounds used in this study. It was no easy matter to collect and classify data because the classification system of the Department did not lend itself to that type of use of the statistics accumulated over a period of years. The present project proved so valuable that the authorities of the Department of Tourism, Fish and Game decided that, starting in 1973, new forms would be used and a data bank would be formed in order to make appropriate information more readily available.

The data obtained were then matched with the different characteristics of the county of origin for the purpose of calculating an acceptable estimate of recreation visits. For example, if, during the sample period from county A, 200 parties originated totaling 567 visitor/days to campground χ_1, the number 567 was entered as the value for the dependent variable for county A. The variables entered as independent variables are different socioeconomic characteristics of the origin county. Data inputs for independent variables used in the present study are derived through calculation from raw data obtained from a variety of sources.

The 1970 census has been used extensively to determine the population (χ_1), the per capita income (χ_2), the average age of the head of the household (χ_4) and the average population age (χ_5).

The round-trip cost (χ_3) from the origin county to the destination area has been calculated by measuring the distance in miles from the approximate center of gravity of the population within every county to the sample campground. The measure of these distances was taken along the major highways most likely to be followed by the park users in traveling to the campgrounds.

The distance found is then multiplied by $0.19, which is the average cost per mile for travelling by car within the Province of Quebec as calculated and published by the Quebec Automobile Club.[6]

The degree of urbanization (variable X_6) was constructed for each county. One of three values (1, 2 or 3) was attributed to each county in the Province of Quebec. A value of 3 was given to high density counties, a value of

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[6]This cost has been calculated for a 1971 Chevrolet Impala, as follows:

Item variable	Average cost per mile
1- Oil and gas	$0.0345
2- Maintenance	0.0085
3- Tires	0.0075
	$0.0505

Fixed cost	Cost per year
1- Insurance fire	$30.00
2- Insurance collision	145.00
3- Insurance	237.00
4- Driving permit, license fees	45.00
5- Depreciation (3 year period)	945.00
	$1,402.00

For an average of 10,000 miles per year

A-	Variable cost	5.05 X 10,000-	$505.00
B-	Fixed cost	$1,402.00	$1,402.00
			$1,907.00 or
			19 cents/mile

2 to medium density counties, and a value of 1 to counties with the lowest density of population, as follows:

1 - A high density county has been defined as a county that comprises a major city such as Quebec or Montreal with a population greater than 100,000.

2 - A medium density county may be an area located within 50 miles of a major city: Or a county which includes a city having between 50,000 and 100,000 of population.

3 - A low density county is one which is located in a rural area and includes no major city.

The substitution effect (variable χ_7) was constructed for each county in the Province of Quebec. The model thus obtained takes into account, for any campground, the effect of all the competing campgrounds of the same type within 200 miles of the center of each county. Data used in this analysis indicated that a great majority of the visitors originate within 200 miles of each sample campground. The assumptions underlying this variable are as follows:

(1) The larger the number of campgrounds located within the 200-mile radius of any county and offering the same kind of facilities and entertainment, the less likely residents of that county will visit any particular campground,

(2) The camping attraction index is an important variable used to measure the attraction of a site on the users. The number of visitors attracted to a recreation area is generally considered as directly proportional to the value of the index. On the other hand, Renoux[7] believes that the logarithm is a better indicator of the importance of the attraction index. To prove his point, he has demonstrated that the attraction index of one very attractive area is of less importance than the added influence of many recreation areas of lower attraction indices, even if the total of these indices is close to the attraction of the more attractive area.

(3) The distance between the campground and the origin county also affects the number of visits to recreation areas. The value of the number of visitors to a particular recreation area was assumed to be inversely proportional to distance. The substitution effect variable was determined as follows.

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[7] Maurice Renoux, "Techniques Econométriques de Prévision de la demande Touristique et Amorce de leurs Intégrations dans un Système Décisionnel" (Unpublished Doctoral dissertation, Université Aix-Marseille, France, 1972), p. 408.

$$\chi_j = \sum_{i=1}^{n} \frac{\log_{10} s_i}{d_{ij}}$$

where

χ_j = The substitution effect for county j

n = The number of campgrounds located within a 200-mile radius from the county of origin

s_i = The attraction index of the different campgrounds, as described below.

d_{ij} = The distance from the campground to the center of gravity of the population for county j.

There are as many terms in the gravity equation as there are campgrounds within 200 miles from the center of county j (n equals the number of campgrounds within 200 miles from the center of gravity of county j). In our calculations, the logarithm of any campground attraction index has been weighted by dividing it by the distance, in miles, from the campground to the center of gravity of the county. Large numeric values associated with the substitution effect variable are expected for counties which have very attractive campgrounds in their vicinity, whereas counties having few campgrounds in their neighborhood are expected to have smaller numeric gravity values.

The Attraction Index

Many methods of measuring the attractiveness of a recreation area have been suggested. Wenger and

Videback[8] explored the usefulness of the eye pupillary response as a measure of aesthetic reaction to photographs of forest scenes.

Factor analysis has been used by Van Doren,[9] Shafer[10] and the Ontario Department of Highways[11] to determine an attraction index. The following section contains a description of the procedure observed in applying the factor analysis to this type of study. This is followed by a description of the work done in the Province of Quebec, where such a procedure will be used in order to obtain the required attraction index for this specific study.

In the present research program, factor analysis is used purely as a tool intended to help derive a useful attraction index from data obtained in the course of two different surveys. In the first one, abundant information

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[8]Wiley D. Wenger Jr., Richard Videback, Pupillary Response as a Measure of Aesthetic Reaction to Forest Scenics Report No. 1, Project K, 10-272 (Washington, D.C.: U.S. Department of Agriculture, Bureau of Economic Research, Sept. 1968).

[9]Carlton S. Van Doren, "An Interaction Model for Projecting Attendance of Campers at Michigan State Parks: A Study in Recreational Geography" (Unpublished Ph.D. dissertation, Michigan State University, 1967).

[10]Elwood L. Shafer, J. F. Hamilton, Elizabeth A. Schmidt, "Natural Landscape Preferences: A Predictive Model," Journal of Leisure Research, 1, No. 1 (Winter 1969).

[11]Ontario Department of Highways, A System Model for Recreational Travel in Ontario, Report No. R.R. 148 (Toronto: Department of Highways of Ontario, 1967).

was collected on the characteristics of different campgrounds. In the second one, made by the Department over a period of several months, data were collected on a sample of 700 campers who have used the camping facilities.

Factor Analysis

Cooley and Lohnes define multivariate analysis as: ". . . generally considered to include those statistical procedures concerned with analyzing multiple measurements that have been made on a number N of individuals. The important distinction is that the multiple variates are considered in combination, as a system."[12]

Factor analysis, a multivariate statistical method, has that unique characteristic of making it possible to consider a large number of interrelated variables and reduce them to a smaller number of factors. As defined by Schwartz:

> ". . . this technique attempts to determine the number and nature of the underlying factors affecting the relationship between a set of variables. This technique maintains, in effect, that the variables can be added and studied together rather than separately. Two advantages of utilizing this technique are immediately apparent. First, the combined influence of the most widely different variables can actually

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[12] William W. Cooley and Paul H. Lohnes, Multivariate Procedures for the Behavioral Sciences (New York: John Wiley and Sons, 1962), p. 1.

> be studied. Secondly, this technique limits the number of variables with which the research must cope."[13]

Factor analysis follows different specific steps which are namely: (1) Correlation, (2) Initial Factors, (3) Rotated Factors, (4) Communality, (5) Eigenvalue, (6) Factor Scores.

Correlation

It is first necessary to build a correlation matrix which is an m by m rectangular array of correlations between pairs of individual variables. This matrix is instrumental in determining the coefficients of the linear combinations which produce the factors.

Initial Factors

A factor may be defined as a linear combination of variables in a data matrix, the variables thus combined being of such a nature that, whenever any change occurs in one of them, an identical or corresponding change occurs in the second or any other related variables; it is then clear that if such two variables are used as independent variables to explain a dependent one, then, only one of these two should be used.

The above-mentioned correlation matrix may be factored by constructing a set of new variables on the basis

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[13]Ronald D. Schwartz, "Operational Techniques of a Factor Analysis Model," The American Statistician, (October 1971), p. 38.

of the interrelations exhibited in the data. In so doing, it is possible to define the new variables either as mathematical transformations of the original data, or in the form of inferential assumptions about the structuring of variables and about their source of variation.

The former approach, which used defined factors, is called principal-component analysis and has been defined by Nie et al as a:

> ". . . method of transforming a given set of variables into a new set of composite variables or principal components that are orthogonal (uncorrelated) to each other. No particular assumption about the underlying structure of the variables is required. One simply asks what would be the best linear combination of variables-best in the sense that the particular combination of variables would account for more of the variation in the data as a whole than any other linear combination of variables. The first principal component, therefore, may be viewed as the single best summary of linear relationships exhibited in the data. The second component is defined as the second best linear combination of variables, under the condition that the second component is orthogonal to the first. To be orthogonal to the first component, the second one must account for the proportion of the variance not accounted for by the first one. Thus the second component may be defined as the linear combination of variables that accounts for the most residual variance after the effect of the first component is removed from the data. Subsequent components are defined similarly until all the variance in the data is exhausted."[14]

This solution, however, does not yield a framework which is easily interpreted; the configuration of this

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[14]Nie, Bent and Hull, "Statistical Package for the Social Sciences," op.cit., p. 216.

factor structure is not unique. One factor solution can be transformed into another without violating the basic assumptions or the mathematical properties of a given solution. As mentioned by Nie _et al_:

> ". . . there are many statistically equivalent ways to define the underlying dimensions of the same set of data. This indeterminancy in a factor solution is, in a way, unfortunate because there is no unique and generally accepted best solution. On the other hand, not all the statistical factor solutions are equally meaningful in theoretical terms. Some are simpler than others; some are more informative than others; and each tells us something slightly different about the structure of the data. Therefore, one is left to choose the best rotational method to arrive at the terminal solution that satisfies the theoretical and practical needs of the research problem."[15]

Rotated Factors

In choosing a reference frame for the interpretation of the variables in terms of factors we must decide on the criterion by which to make the choice. According to Thurstone[16] it is necessary to rotate the factors' axis so that there will be as many zero or near zero loadings as possible in the factor analysis matrix. In other words, it seems unlikely that, if we use many observation units, all the variables involved should be important for all the observation units. It seems much more likely (unless the

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[15]Nie, Bent and Hull, "Statistical Package for the Social Sciences," _op.cit_., p. 212.

[16]L. L. Thurstone, _Multiple Factor Analysis_ (Chicago: University of Chicago Press, 1940), p. 93.

observation units are very similar) that some groups of variables should be concerned with some of the observation units and other groups with other observation units.

The numerical values of the factor loading are, of course, dependent on where we put the factorial reference frame. For every position in which we like to place the reference axis we get a new set of loadings. That means 360 different positions if we vary by only one degree at a time, and, as it is obvious that we may vary by minute fractions of a degree, an infinite number of such loadings are possible.

We thus have, mathematically, a great number of solutions to the factor problem and for every position in which the axes of references are placed, we get a new set of loadings. However, since we are interested in a unique solution, it is possible to define different criteria which can be used to indicate whether or not we have rotated the factor axes to a satisfactory position. According to Adcock[17] there are basically two such criteria: (1) The explanation should be as simple as possible. (2) It must be consistent with other explanations which we accept.

The loadings or numbers in a given row of the factor analysis matrix represent both regression weights and correlation coefficients of factors to evaluate a given

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[17] C. J. Adcock, Factorial Analysis for Non-Mathematicians (Melbourne: University Press, 1954), p. 29.

variable. Each variable has a factor loading on each factor and the loading can be considered as a simple correlation between a variable and a factor. More specifically, we could represent it by using the following general formula:

$$Z_j = a_{j1} F_1 + a_{j2} F_2 + \ldots + a_{jm} F_m + d_j U_j$$
$$(j=1, 2, \ldots n)$$

where

Z_j = Variable j

F = A common factor

U_j = A unique factor

a_{j1}, d_j = Regression weights

Communality

The total variance of a variable accounted for by the combination of all common factors, designed by h^2, is usually referred to as the communality of the variable.

The variance of a variable accounted for by a factor is given by the square of the respective factor loadings. It is then possible to express the proportion of the variance in one variable accounted for by all common factors as follows:

$$h_1^2 = \sum_{i=1}^{m} a^2_{1i} \quad (i=1, 2, \ldots m)$$

where

h_1^2 = Variance accounted for by variable 1

m = The number of factors

a_{1i}^2 = The square of the respective factor loadings, for variable 1 in each factor.

Eigenvalue

The total variance of one factor accounted for by the combination of all common factors is usually referred to as eigenvalue. The variance of a variable j accounted for by factor i is the square of the respective factor loadings. It is therefore possible to calculate the total amount of variance accounted for by a factor, by adding the square of the loadings in each column; we may say that the variance accounted for by a particular factor is expressed as follows:

$$K_1^2 = \sum_{j=1}^{n} a_{j1}^2 \quad (j = 1, 2, . . . n)$$

where

K_1^2 = Variance accounted for by factor 1

a_{j1}^2 = The square of the respective factor loadings for the different variables in factor 1

n = The number of variables

Factor Scores

After the terminal factor matrix is obtained, it might be necessary to build composite scales that represent the theoretical dimensions associated with the respective factors. By means of a factor score matrix, it is possible to assign factor scores to each observation.

A factor score can be defined as the relative importance of a factor in one observation. For example, in one of the campgrounds observed, one of the factors could be more important than the same factor in a second campground, hence there is a factor score for each factor and each observation (campground). Thus, it shows that one observation possesses the general characteristic particular to one factor to a higher or lower degree than the other observation in the model. It is then possible to develop an index showing the importance of a particular characteristic for each observation.

To obtain the factor score, it is necessary to make a conversion of the factor loading obtained in previous operations into convenient weights which, when multiplied by the standardized real value of the variable, insure that each one contributes in proportion to its importance. This weight or factor score coefficient is determined from the following formula:

$$a = s^{1} R^{-1}$$

where

a = The factor score coefficient matrix

s^{1} = The rotated factor matrix such as explained above

R^{-1} = The inverse of the correlation matrix

The factor score coefficient represent the regression weights of each standardized variable to construct a factor index.

The factor score for the first observation can then be obtained by solving the following equation:

$$Q_1 = \sum_{i=1}^{m} j_{1i} \; z_{1i}$$

where

Q_1 = The factor score for the 1st observation

j_{1i} = The factor score coefficients defined from the previous equation for the different variables in the first observation.

z_{1i} = The standardized value of the different variables in the first observation.

As a factor score is obtained for each observation and each factor, it is then possible to make a comparison between the various observations and to determine to what degree a particular observation possess the characteristics particular to a specific factor such as it has been defined by the factor analysis.

Proposed Application of the Factor Analysis

As stated above, the present study applies the factor analysis method only to the state-owned campgrounds in the Province of Quebec which were identified as destination campgrounds above (see page 57). The Department of Tourism, Fish and Game is the owner and administrator of 27 destination campgrounds distributed throughout the province. In the present study, these campgrounds have been visited and thoroughly studied in order to gather the necessary information to carry out this particular analysis and thus supply all the information needed to arrive, through factor analysis, at an attraction index.

The Variables

According to professional judgment, a total of 48 characteristics were selected as representative of the general attractiveness of a campground. We may find these characteristics inside a campground, or outside but within reasonable distance from the campground.

These different characteristics were then grouped under three major headings: (1) The facilities and services; (2) The physical environment and (3) The recreational activities. These characteristics are the variables that will be used in our survey. They are listed below according to the grouping described above.

TABLE 6

List of Variables

A - Facilities and services:

1 - Showers	7 - Playground
2 - Flush toilets	8 - Swimming pool
3 - Laundry	9 - Roads
4 - Electricity	10 - Type of sites
5 - Grocery	11 - Shelters
6 - Restaurant	

Table 6 (Cont'd)

B - Physical environment:

1 - Elevation	10 - Quality of water for fishing
2 - Overlook	11 - Presence of body of water
3 - Falls	12 - Offshore composition
4 - Virgin Forest	13 - Foreshore composition
5 - Shade	14 - Water pollution
6 - Vegetation	15 - Turbidity
7 - Quietness of surroundings	16 - Offshore composition
8 - Flies and pests	17 - Boat rental
9 - Hiking trails	

C - Activities:

1- Swimming	11 - Ski
2 - Angling	12 - Sun bathing
3 - Organized activities	13 - Badminton
4 - Hiking	14 - Horseback riding
5 - Organized sports (team)	15 - Sailing
6 - Hunting	16 - Yachting
7 - Canoeing	17 - Water skiing
8 - Tennis	18 - Camp fire
9 - Golf	19 - Bicycling
10 - Boating	

The variables listed above have been inventoried and graded according to a system devised by the author.

In the following section we discuss the grading system used for each variable. Different sources of information have been used as guidelines. However, in many cases, there is a great deal of subjectivity and it was often necessary to rely on professional judgment.

Activities

Different types of grading systems were considered; however, after many trials, it was decided to use a trichotomous grading system. In this system, three different values can be given to any activity; such a system is based on the assumption that the absence of the activity has no value and a grade of zero is then attributed; if the recreation activity is made available on the campground, we then assume that it adds to the attractiveness of the area. It is then given a value of one, if the activity is of average quality, and a value of two if it is of a much higher quality.

In order to have the most possibly realistic measure of the variables in the system described above, we have also given numeral values to activities located outside the campground. These values however vary with the distance at which they happen to be from the recreation area (campground). These variables are graded such as shown in the following examples.

Activities within the campground:

	Value
Absence of the activity	0
Average quality of the activity	1
Good quality of the activity	2

Activities outside the campground:

Quality of activity or facility	Distance from recreation area	Value
good	1 mile or less	2
good	1 to 3 miles	1
average	1 mile or less	1
average	more than 1 mile	0

The Physical Environment

Different classifications have been studied in order to determine to what extent they could help in determining the grading system needed for the different physical environment characteristics. The Canada Land Inventory,[18] the deVries[19] and the ORRRC[20] methods were carefully studied.

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[18] Field Manual: Land Capability Classification for Outdoor Recreation (Ottawa: Department of Forestry and Rural Development, 1967).

[19] L. deVries, An Approach to the Recreational Capabilities of Shoreland by Photo Interpretive Method (Toronto: Lockwood Survey Corporation Limited, 1966).

[20] U.S. Outdoor Recreation Resource Review Commission, Potential New Sites for Outdoor Recreation in the Northeast (Washington, D.C.: Government Printing Office, 1962).

In the following section, the grading system used for such natural resource characteristic is explained.

Viewpoint, Waterfalls, Virgin Forest, Trails:

Each of these natural characteristics is very important and can have a great influence on the attractiveness of a recreation area. However a great deal of subjectivity is involved in grading these variables and what one individual would rate high can be rated in a completely different manner by another individual. In order to get around such a problem, a dichotomous scaling system is used where a value of 1 is given if the characteristic is present and 0 if it is absent.

Vegetation:

This characteristic is of great importance since different types of vegetation and certain combinations of the same add value of different importance to the attractiveness of the campgrounds, because they increase the enjoyment of the park users. A short study of the different possible vegetation types existing in Quebec indicates a great number of possible combinations. In this study, the vegetation characteristics have been graded according to four basic classes:

Barren	0
Evergreen	1
Mixed evergreen and deciduous	2
Deciduous	3

In this classification the deciduous forest has been given the highest rating because it has been observed that people in Quebec prefer the deciduous type of forest mainly because of the smaller amount of flies and pests which are very abundant and extremely unpleasant during the best part of the summer season. It is possible that in other parts of the country, where there are fewer pests, the same persons would prefer a mixed type of forest. Another factor which can play an important role is the fact that in Quebec a deciduous forest usually grows in areas where the climate is less rigorous.

Quietness of Surroundings:

This characteristic does not apply to any natural resource variable as such, but to the overall quality of the environment. It was graded according to the general level of noise in the immediate surroundings for example; if a campground is located very close to a heavily used highway, or an airport where the level of noise is high, it would be graded low.

The quality of the surroundings has been graded for each park according to the following classification:

Very noisy	0
Moderately noisy	1
Quiet	2

Fishing:

The lakes and rivers in the Province of Quebec have always been renowned for their fishing qualities. It is therefore reasonable to assume that the quality of fishing can influence, to a certain degree, the general attractiveness of the campground. For that reason the fishing quality of bodies of water found at different campgrounds or in their immediate vicinity are quantified in order to be included in the attraction index. The bodies of water present at each campground have been rated with the help of Gilles Shooner of the Wildlife Division, Department of Tourism, Fish and Game, according to the following numerical scale.

No fishing possibilities	0
Poor fishing conditions	1
Medium fishing conditions	2
Good fishing conditions	3

Quality, as used in the above classification, is based mainly on the type of sport fishing that can be practiced at any particular site, for example, salmon fishing and trout fishing being rated higher than pike or wall-eyed fishing. It was however first assumed that there was a relatively good chance of success, or a relatively good chance of catching some specimens of the desirable species.

Relief:

In Quebec, camping grounds are located throughout the Province, and are associated with a great variety of topographies. According to deVries,[21] areas with high relief and showing strong contrast are favored by a great number of park users.

After consultation with professionals in the field of recreation, the following grading is assumed:

0 - 100 feet	0
100 - 200 feet	1
200 - 700 feet	2
700 feet and above	3

Body of Water:

The types and shapes of the bodies of water present in a campground area may be of great importance in grading the park, since activities of different types will be made possible on different bodies of water. A great number of activities are usually possible on a lake, such as swimming, sailing, water skiing, fishing, whereas a river, even if it also has many possible activities, is usually limited as compared to a lake. This characteristic is graded according to the following classification:

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[21]DeVries, "An Approach to the Recreational Capabilities of Shoreland by Photo Interpretive Methods," op.cit.

No water	0
River	1
Lake	2
Lake and River	3

Shore:

This variable is of prime importance, since swimming is one of the most popular outdoor activities practiced by campers. In order to describe this variable, the following three characteristics have been used: the composition characteristic of the offshore, the composition characteristic of the foreshore, and the length of the beach.

Each of the above characteristics have been discussed by deVries. However, some minor changes have been brought in the following, such as the presence of grass on the offshore. Each has been graded according to the following classifications.

Composition characteristics of the offshore:

No offshore	0
Rock	1
Gravelly	2
Grass	3
Sand	4

Composition characteristics of the foreshore:

No foreshore	0
Rock	1
Gravelly	2
Sand	3

Length of the beach:

No beach	0
1 to 100 feet	1
100 to 500 feet	2
500 to 1000 feet	3
1000 feet and more	4

Water quality:

The water quality of a body of water, when used for outdoor recreation activities, is related to its pollution and its natural turbidity. It is obvious that clear water, free of any pollution, is superior and preferred by park users; however the measurement of such characteristics is very difficult and subjective. In order to quantify these characteristics, the author relied on his own experience and judgment, and graded them according to the following classification.

Pollution of water:

No water	0
High pollution	1
Moderate pollution	2
No pollution	3

Turbidity of water:

No water	0
Turbid water	1
Clear water	2

Services:

The popularity of any campground among the park users depends greatly upon the facilities and services available at a recreation area. Facilities and services have been defined in different ways by different individuals.

For the purposes of this study, services can be defined in terms of the utilities such as toilets, showers, grocery, etc., and which may be found within or close to the campground.

Different types of grading systems have been considered. However the most satisfactory and less subjective one seemed to be a dichotomous scaling system, where a value of one is given to the variable, if present in the area, and a value of zero if it is absent. For instance, if there are flush toilets on the campground, a value of one is given to the variable, and if, on the contrary, these are lacking, a value of zero is given.

Flush toilets:

Presence of flush toilets	1
Absence of flush toilets	0

The Role of Factor Analysis

The list of variables defined above includes outdoor activities variables. However, it was found, by a trial and error process, that the factor analysis was improved when these trichotomously-scaled activity variables were deleted; the major problem encountered, when using the activity variables in the factor analysis, was that the different activities did not correlate with a common factor, but instead correlate with different factors.

The results of the initial factor analysis conducted after the deletion of the activity variables were not entirely satisfactory. It was therefore decided to eliminate some additional variables which have been found of no useful significance when working out the factor analysis. It was found that two of these variables, namely the presence of toilets and showers, have no detectable correlation with any particular factor used in the present analysis. Another variable, the presence of a waterfall, which occurs in only one of the provincial campgrounds, has also been deleted, as a single observation is insufficient to establish correlation.

After many runs through the factor analysis program, it was found that the three-factor solution was the most satisfactory. A short study of the variables grouped by the factor analysis method shows that the first factor groups together all the physical environment variables except water which characterize the campgrounds; the second factor groups all the water characteristics and, finally, the third factor groups the different services present in the park. So the three factors were named respectively, physical environment, water and service factors.

Factor Loading:

The following table shows the factor loadings as determined by the factor analysis for each of the 25 variables. The variables which are included in the factor have been underlined in Table 7 for the sake of classification.

TABLE 7

Varimax Rotated Factor Matrix

		Factor 1 Physical environment	Factor 2 Water	Factor 3 Services
1	Laundry	-0.17592	-0.03640	0.90157
2	Electricity	-0.00814	-0.26059	0.55269
3	Grocery	-0.27877	-0.10993	0.90137
4	Restaurant	-0.15249	-0.18563	0.86472
5	Playground	-0.23713	0.25315	0.66013
6	Swimming pool	-0.45083	-0.63489	0.28218
7	Roads	-0.33978	-0.11592	0.53124
8	Type of site	0.37858	-0.09773	0.03240

TABLE 7 (Cont'd)

		Factor 1 Physical environment	Factor 2 Water	Factor 3 Services
9	Presence of shelter	0.00700	-0.16900	0.54300
10	Relief	0.74720	0.08815	0.49215
11	Panorama	0.30623	-0.09414	0.34647
12	Virgin forest	0.87569	0.15642	-0.27372
13	Shade	0.78087	-0.-1351	-0.09737
14	Vegetation	0.75019	0.10913	-0.08866
15	Quietness	0.67250	0.16841	-0.34129
16	Flies and pests	-0.75126	-0.41917	0.20765
17	Hiking trails	0.87570	0.15642	-0.27372
18	Quality of fishing	0.77497	0.20221	-0.10754
19	Bodies of water	0.06685	0.82365	-0.02750
20	Offshore composition	0.06963	0.96309	-0.15690
21	Foreshore composition	0.06882	0.98228	-0.17879
22	Water pollution	0.75234	0.54487	-0.09750
23	Turbidity of water	0.64370	0.56143	-0.25626
24	Length of the beach	0.07337	0.84756	-0.24898
25	Boat rental	0.26000	0.43579	0.30506

Following the results obtained above, it was found necessary to build a measuring scale that would represent the relative value of each variable corresponding to the three factors selected. In order to obtain the desired measuring scale, two successive steps were necessary. The first one being to establish the factor score coefficients that determine the correlation between variables and the factors obtained above; the second one being to establish the factor scores themselves.

Factor Score Coefficients:

Nie *et al*[22] has outlined in statistical package for the Social Sciences a subprogram in which they propose to use the least square regression method to estimate the factor score coefficients. They explain that such a program defines the best set of coefficients for the variables in such a way that the correlation between the composite variable and the hypothetical factor is maximum.

The formula used in calculating the score coefficient matrix is:

$$A = s' R^{-1}$$

where

A = The factor-score coefficient matrix

s = The rotated factor structure matrix

R = The correlation matrix

For instance, the regression coefficient associated with the j^{th} factor is then given by:

$$a_{il} = \sum_{p=1}^{m} r_{lp}^{-1} s_{lj}$$

where

a_{jl} = Regression coefficient associated with the factor

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[22] Nie, Bent, and Hull "Statistical Package for the Social Sciences," op.cit., p. 226.

r^{-1}_{lp} = Element of inverse of the correlation matrix

s_{lj} = Element in j_{th} column of the rotated factor matrix

$j = 1, 2, \ldots, K$

$l = 1, 2, \ldots, m$

The factor score coefficients thus obtained are shown below in Table 8.

TABLE 8

Factor Score Coefficient

		FACTOR 1	FACTOR 2	FACTOR 3
1	Laundry	-0.53825	-1.47252	2.66338
2	Electricity	0.03009	-0.96861	1.03714
3	Grocery store	-0.64535	-0.51069	0.95394
4	Restaurant	-0.11750	-0.46813	1.62458
5	Playground	-0.68889	0.56815	0.90274
6	Swimming pool	-0.76400	-1.96419	1.86111
7	Roads	-0.78430	-0.74037	2.05202
8	Site	1.39230	0.08070	0.16954
9	Shelter	0.23971	-0.35388	0.83972
10	Elevation	1.71969	0.73783	-0.28186
11	Viewpoint	0.23917	-0.49275	0.66872
12	Virgin forest	1.38254	0.36052	-2.22840
13	Shade	1.59370	-0.11069	-1.10721
14	Vegetation	3.18497	-0.11798	-0.77155

TABLE 8 (Cont'd)

		FACTOR 1	FACTOR 2	FACTOR 3
15	Quietness	2.26452	0.30693	-3.47351
16	Flies and pests	-2.77755	-0.94988	2.31977
17	Hiking trail	2.35697	0.62948	-2.45126
18	Fishing quality	3.26238	0.53754	-1.53450
19	Bodies of water	1.55506	0.64168	-0.71194
20	Offshore composition	1.11117	1.30178	-1.21766
21	Foreshore composition	1.33342	1.34912	-1.21156
22	Water pollution	1.72460	0.71448	-0.95275
23	Turbidity of water	1.09641	0.37849	-1.33761
24	Length of the beach	0.59241	1.33228	-1.25978
25	Boat rental	0.60978	0.81500	0.61953

Factor Scores:

Once the factor score coefficients were obtained, it was deemed sufficient to go to the second step and determine the factor scores for all 27 provincial campgrounds used in this model. The factor scores, which represent the relative importance of one factor at one particular site compared with the same variable in another site, were obtained through the standard analytical method.

To build the factor scores scale, two methods can be used. These methods are described by Nie et al in the following manner:

> "It is customary to build factor scales employing only those variables that have substantial loadings on a given factor. It seems, however, that the complete estimation has some advantages over the first method. In the shorter method, the influence of variables not included in the scale is not controlled; they will affect the scale through this intercorrelation with the variables used in the scale. In the complete estimation method, on the other hand, some variables are simply used as supression variables to give the best estimate of the given factor."[23]

In the present paper, because of the amount of work involved in the complete estimation method, it was decided to build the factor score scale by employing only those variables which have substantial loadings on the given factor. In other words, only the value of the variables in each factor with the highest loadings are used. For example, if different variables have the following loadings for three different factors, only variables 1 and 2 will be used in order to determine the factor score for one observation in factor number 1.

	Factor 1	Factor 2	Factor 3
Var. 001	0.88920	0.07829	0.03230
Var. 002	0.78523	0.014023	0.005768
Var. 003	0.10210	0.67352	0.06342
⋮	⋮	⋮	⋮
Var. 0070	0.32460	0.34210	0.04274

[23] *Ibid.*, p. 226.

Then, in order to determine the different scores, the following formula is used by Nie *et al*:[24]

$$\text{Factor Score} = \sum_{i=1}^{m} \frac{a\ (\chi_1 - \bar{x}_i)}{sd_i}$$

where

a = The standard-score coefficient

χ_1 = The original value of the variable i

$\bar{x}_i$ = The mean of the original values for a variable i

sd_i = The standard deviation of the original value for a variable i

m = The number of variables.

The factor scores for the different campgrounds considered in the present study are shown below in Table 9.

TABLE 9

Factor Scores

		Factor 1 Physical environment	Factor 2 Water	Factor 3 Services
1	Lac Dozois	22.46	4.23	-11.29
2	Belle Rivière	18.71	6.04	-10.60
3	Moisie	17.22	4.63	5.02
4	Lac Albanel	19.01	.79	- 8.45

[24] *Ibid*., p. 227.

TABLE 9 (Cont'd)

		Factor 1 Physical environment	Factor 2 Water	Factor 3 Services
5	Rivière Chalifour	- .65	4.39	-10.60
6	Lac d'Argenson	18.71	-6.61	-13.56
7	Lac Normand	15.66	7.75	-13.56
8	Lac Savary	19.01	7.75	-13.56
9	Rivière Matane	2.60	-4.12	2.78
10	Rivière des Écorces	8.60	-2.64	- 7.64
11	Lac Arthabaska	9.67	-1.85	-10.60
12	Lac Lajoie	20.23	6.90	-10.60
13	Lac La Vieille	23.69	5.42	- 7.64
14	Lac Monroe	12.96	7.75	4.48
15	Lac Bellevue	21.45	3.44	-13.56
16	Port Daniel	25.16	4.12	- 8.93
17	Lac Rimouski	23.94	4.30	-13.56
18	La Sablonnière	8.75	5.49	-13.56
19	Voltigeurs	-27.66	-4.12	7.53
20	Mont Orford	3.13	6.78	8.77
21	Oka	- 7.34	7.75	-10.60
22	Stoneham	- 9.34	4.54	8.13
23	Mare du Sault	17.04	-2.65	8.19
24	Barrière John	28.46	-4.12	- 7.63
25	Etang à la Truite	10.06	5.35	-13.56
26	La Loutre	15.26	7.07	5.80
27	Lac du Milieu	15.38	6.04	- 5.28

In the above table, factor scores show the relative importance of one factor in the different campgrounds. For example it shows that for the Lac Dozois campground, the physical environment factor is more important with a value of 22.46 than that of Belle Rivière which shows a value of 18.71.

Adjusted Scores

The above table lists the factor scores determined for each of the 28 campgrounds selected. However, these values have to be standardized with a mean of 0.00 and a standard deviation of 1.0 for the following reasons, as described by Racine:

> "The method of standardization makes it possible to compare values pertinent to different variables. These values may follow different curves which could differ widely from one another."[25]

Table 11 shows these standardized values.

TABLE 10

Standardized Factor Scores

		Factor 1	Factor 2	Factor 3
1	Lac Dozois	.71	.13	- .69
2	Belle Rivière	.42	.59	- .60
3	Moisie	.44	.23	1.23

[25]J. B. Racine, Modèles Graphiques et Modèles Mathématiques en Géographie Humaine. Essai de Méthodologie Expérimentale (Ottawa: Université d'Ottawa, Department de Geographie, 1969), p. 42.

Table 10 (Cont'd)

		Factor 1	Factor 2	Factor 3
4	Lac Albanel	.44	- .74	- .30
5	Rivière Chalifour	-1.05	.17	.60
6	Lac d'Argenson	.42	.73	- .96
7	Lac Normand	.18	1.02	- .96
8	Lac Savary	.44	1.02	- .96
9	Rivière Matane	- .84	-1.98	1.04
10	Rivière des Ecorces	- .37	-1.60	.23
11	Arthabaska	- .28	-1.40	- .60
12	Lac Lajoie	.54	.81	- .60
13	Lac La Vieille	.80	.43	- .24
14	Lac Monroe	- .03	1.02	1.25
15	Lac Bellevue	.63	- .07	- .96
16	Port Daniel	.92	.10	- .39
17	Lac Rimouski	.98	.15	- .96
18	La Sablonnière	- .35	.45	- .96
19	Voltigeurs	-2.24	-1.97	1.63
20	Mont Orford	-1.40	.78	1.78
21	Oka	-1.61	1.02	- .60
22	Stoneham	-1.77	.21	1.70
23	Mare du Sault	.28	-1.60	1.70
24	Barrière John	1.18	-1.97	- .23
25	Etang à la Truite	- .26	.41	- .97
26	La Loutre	.15	.85	1.41
27	Lac du Milieu	.16	.59	- .05

Table 10 shows the same relative importance of one factor as in Table 9 but presented on a different basis, as explained above.

In Table 11 for convenience, we standardized around a mean of 100 and by using a standard deviation of 40 eliminate the negative values.

TABLE 11

Adjusted Factor Scores $\bar{x}$ = 100
s.d. = 40

		Factor 1	Factor 2	Factor 3
1	Lac Dozois	128.46	104.98	72.12
2	Belle Rivière	116.80	122.96	70.03
3	Moisie	117.60	109.18	149.28
4	Lac Albanel	117.60	70.38	88.00
5	Rivière Chalifour	44.11	106.78	76.03
6	Lac d'Argenson	116.20	129.18	61.61
7	Lac Normand	107.20	80.34	61.61
8	Lac Savary	117.60	80.84	61.61
9	Rivière Matane	28.24	20.77	101.69
10	Rivière des Ecorces	85.26	36.00	90.85
11	Arthabaska	88.80	43.99	76.03
12	Lac Lajoie	121.60	132.40	76.03
13	Lac La Vieille	132.07	117.21	90.42
14	Lac Monroe	98.80	140.77	150.06
15	Lac Bellevue	125.28	97.21	61.61

Table 11 (Cont'd)

		Factor 1	Factor 2	Factor 3
16	Port Daniel	136.81	104.42	84.40
17	Lac Rimouski	139.22	106.00	61.61
18	La Sablonnière	86.99	117.98	61.61
19	Voltigeurs	9.91	21.16	165.27
20	Mont Orford	155.98	131.20	171.26
21	Oka	35.60	140.77	76.03
22	Stoneham	29.21	108.41	168.00
23	Mare du Sault	111.20	36.00	168.00
24	Barrière John	147.21	21.20	90.82
25	Etang à la Truite	90.00	116.39	61.21
26	La Loutre	106.42	134.99	156.49
27	Lac du Milieu	106.42	123.60	98.03

Campers' Preference Study

In the present study, we had sufficient data to indicate the most desired characteristics requested by the users of the campgrounds. These data were obtained through a survey made by the research service among the campers of the Province of Quebéc.[26] Because of this, we are in a position to obtain an attraction index based on factors which are themselves evaluated or weighed according to the preference expressed by the users themselves.

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[26]Service de la Recherche, Essai sur les usagers des terrains de camping provinciaux du Quebéc (Quebéc: Ministère du Tourisme de la Chasse et de la Pêche, 1971), pp. 102-109.

The present approach is quite different from that of most of the studies we have consulted and in which equal weight was assigned to each factor. In those studies, the authors assumed that there was no difference in the campers' preference for different campground characteristics. Such an unrealistic assumption was usually made because of lack of information on the recreationist's preference for the various activities.

During the summer of 1971, the Department of Tourism, Fish and Game conducted a survey throughout the Province of Quebec on camper's attitudes toward activities, facilities and various natural characteristics.

This survey was conducted in 17 parks distributed throughout the province, five in the Montreal area, five in the Quebec City area, four in the Gaspe Peninsula, and one in each of the following regions: Eastern Townships, Drummondville, and Lake Saint-Jean (see Map No. 1). A total of 698 interviews were conducted during the summer period; these interviews were distributed as follows:

201 interviews from June 13 to June 30.
167 interviews from July 1 to July 15.
207 interviews from July 16 to July 31.
123 interviews from August 1 to August 18.
698

One of the survey questions consisted in asking the user to list characteristics most desirable in campgrounds he intends to use. Along the same line of thought, during the same survey, the camper was asked to state those characteristics he appreciates the least in the campground he visits. This last question was used as a cross reference permiting the analyst to verify answers obtained in reply to the preceding question.

With all the answers, one single list was then drawn-up. Such a list enumerated the different characteristics preferred by interviewed campers. It was then possible to sort out from this list the different characteristics which could be grouped under each of the factors defined earlier with the factor analysis method. These are (1) natural characteristics; (2) services and (3) water.

Tables 12 to 14 below show the number of persons that preferred each type of characteristics. Each figure shown in these tables, represents the total of positive answers from users.

TABLE 12

Natural Characteristics

	User's preference listed in decreasing order	
1	Quietness of the environment	171
2	Beauty of the site	153
3	Absence of flies	109
4	Natural character	104
5	Lot of space available	30
6	Shade	23
7	Privacy of the sites	22
		612

TABLE 13

Services

	User's preference listed in decreasing order	
1	Overall quality of the services offered	168
2	Good planning of the services offered such as distance between individual campers	104
3	Order and cleanliness	96
4	Quality of welcome at reception	36
5	Access roads	28
6	Internal circulation	11
7	Security	8
8	Facility to obtain a camping site	3
		454

TABLE 14

Water

User's preference listed in decreasing order	
1 Presence of good swimming facilities	62
2 Closeness to water	44
	106

The three tables above indicate that out of a total of 1,172 users, 612 or 52.2% of the people interviewed showed a preference for the natural characteristics, 454 or 38.7% for services and 106 or 9.1% for the presence of water.

From the above, it was concluded that it is possible to attribute weights or value of different magnitudes to the different factor scores obtained for each observation; this is a new element which permits a more refined estimation of the desires of campers. With this in hand, we need not be limited to an assumed equal weight of unity for each factor score, as used by most researchers in the subject area. On the contrary, these preference rankings provide a measure of the extent to which one factor is preferred to another by the campers.

In the above section, it has been shown from our survey that the people going to campgrounds located in provincial parks prefer natural characteristics in a proportion of 1.349 individuals or 612/454 against 1.0 or

454/454 who prefer high quality services and .233 or 106/454 who are more interested in the presence of water. It is important to note that this set of weights applies to the average park visitor and that when these weights are applied to a particular campground it is not certain that visitors may be considered as average visitors.

The following table gives the weighted factor scores for each factor and for each of the different campgrounds. To obtain the figures of Table 15, the adjusted scores found in Table 12 are multiplied by the weights which have been developed in the section above.

TABLE 15

Weighted Park Factor Scores

	Weight = 1.349 Natural Characteristics	Weight = .233 Water	Weight = 1.00 Services
1 Lac Dozois	173.29	24.46	72.12
2 Belle Rivière	157.56	28.65	70.03
3 Moisie	158.64	25.44	149.28
4 Lac Albanel	158.64	16.40	88.00
5 Rivière Chalifour	59.50	24.88	76.03
6 Lac D'Argenson	156.75	30.10	61.61
7 Lac Normand	144.61	18.72	61.61
8 Lac Savary	158.64	18.72	61.61
9 Rivière Matane	38.09	4.84	101.69

Table 15 (Cont'd)

	Weight = 1.349 Natural Characteristics	Weight = .233 Water	Weight = 1.00 Services
10 Rivière des Ecorces	114.24	8.39	90.85
11 Lac Arthabaska	119.79	10.25	76.03
12 Lac Lajoie	164.04	30.85	76.03
13 Lac La Vieille	178.16	27.31	90.42
14 Lac Monroe	133.28	32.80	150.06
15 Lac Bellevue	169.00	22.65	61.61
16 Port Daniel	184.55	24.23	84.40
17 Lac Rimouski	187.80	24.70	61.61
18 La Sablonniere	116.01	27.49	61.61
19 Voltigeurs	13.37	4.93	165.27
20 Mont Orford	210.44	30.57	171.26
21 Oka	48.02	32.80	76.03
22 Stoneham	39.40	25.26	168.00
23 Mare du Sault	150.01	8.39	168.00
24 Barrière John	198.59	4.94	90.82
25 Etang à la Truite	121.41	27.12	61.21
26 La Loutre	143.56	31.22	156.49
27 Lac du Milieu	143.56	28.80	98.03

In Table 15 each column shows the relative value of the characteristics of each campground, this indicates for each site the interest of the users.

Activities:

The relative values of the different activities associated with the parks was not included in the factor analysis calculation but was calculated separately for the reasons given on page 91.

This scale of values is based on the assumption that the presence of an activity has a positive value and that its absence has no value. The activities have then been graded according to the following trichotomous scale:

No activity	0
Medium quality	1
Good quality	2

The following table shows the distribution and relative value of each activity that is offered to campers in the provincial campgrounds of the Province of Quebec.

TABLE 16

Raw Scores

	Swimming	Fishing	Organized activities	Hiking	Organized sports	Hunting	Canoeing	Tennis	Golf	Row boating	Ski	Sun bathing	Horseback riding	Sailing	Yatching	Water ski	Camp fire
Mare du Sault	0	2	1	2	0	0	2	0	0	2	0	1	0	0	0	0	2
Stoneham	2	1	1	0	1	0	1	0	1	2	0	1	2	0	0	0	2
Mont Orford	2	1	1	2	0	0	1	0	2	1	1	1	1	1	0	0	2
Barrière John	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0	2
Etang Truite	0	2	0	2	0	2	2	0	0	2	0	1	0	0	0	0	2
Port Daniel	0	2	0	2	0	2	0	0	0	0	0	0	0	0	0	0	2
Lac Rimouski	2	2	0	2	1	2	2	0	0	2	0	2	0	1	1	1	2
Lac Monroe	2	2	1	2	1	0	2	0	0	2	1	2	0	1	1	1	2
Lac La Vieille	2	2	0	2	0	2	2	0	0	2	0	2	0	1	1	1	2
Lac Lajoie	1	1	0	2	0	0	2	0	0	2	1	1	2	2	2	2	2
Lac Bellevue	2	2	0	2	0	2	2	0	0	2	0	1	0	0	0	0	1
Lac Normand	2	2	0	2	0	2	2	0	0	2	0	2	0	2	0	0	0
Lac du Milieu	2	1	0	2	0	0	2	0	0	2	0	2	0	0	0	0	2
Lac d'Argenson	2	2	0	2	0	0	2	0	0	2	0	2	0	2	0	0	2
Lac Albanel	0	2	0	2	0	0	2	0	0	2	0	1	0	0	0	0	1
Rivière Chalifour	1	2	0	2	0	0	2	0	0	2	0	1	0	0	0	0	2
Moisie	1	2	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0
Lac Arthabaska	0	2	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2
La Loutre	1	1	0	0	0	0	2	0	0	2	0	1	0	1	1	0	0
Belle Rivière	2	2	0	0	0	0	2	0	0	2	0	2	0	1	1	0	2
Rivière des Ecorces	0	2	0	0	0	0	2	0	0	2	0	1	0	0	0	0	1
Rivière Matane	0	1	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1
Oka	2	1	0	1	0	0	1	0	1	1	0	2	1	2	2	2	2
Voltigeurs	1	0	0	1	2	0	1	0	2	1	0	1	1	0	0	0	1
La Sablonnière	1	2	0	2	0	0	2	0	0	1	1	2	0	0	0	0	2
Lac Dozois	2	2	0	1	0	2	2	0	0	2	0	2	0	0	0	0	2
Lac Savary	1	2	0	1	0	2	0	0	0	2	0	0	0	0	2	0	2
Dollard des Ormeaux	1	1	1	1	0	0	2	0	0	2	0	2	2	2	2	2	1

Weights:

In the above-mentioned survey conducted by the Department of Tourism, Fish and Game the preference of the campers for each type of activity was also investigated.

In the survey conducted by the Department, the users of camping facilities were asked to identify those kinds of recreation activities they prefer at campgrounds.

This was an open type of question in which each person gives his personal rating to each of three different activities normally associated with campgrounds; these opinions, were to be based entirely on personal taste. A value of three was given to the first choice, of two to the second choice, and of one to the third choice.

In the following table the number of points given to each activity is distributed between the first three columns according to the choice of individual campers. The fourth column gives the total number of points according to each individual activity. The fifth column is the total number of points expressed in percentage; this value is then used as the weight of each individual activity. In order to arrive at this step it is necessary to make the assumption that the values given to the different activities are interpersonally valid.

TABLE 17

Activity Weights

		Points 1st	Points 2nd	Points 3rd	Total Points	% = weights
1	Swimming	798	332	90	1,220	34.6
2	Fishing	492	144	65	701	19.8
3	Organized activities	144	94	44	282	7.2
4	Hiking	93	98	30	221	6.3
5	Organized sports	90	56	13	159	4.5
6	Excursion	54	56	15	125	3.5
7	Hunting	30	72	16	118	3.3
8	Canoeing	42	52	13	99	2.8
9	Tennis	30	44	20	94	2.7
10	Golf	45	92	17	94	2.7
11	Row boating	21	38	24	83	2.4
12	Skiing	42	26	9	77	2.2
13	Sun Bathing	24	36	6	62	1.8
14	Badminton	27	22	9	58	1.6
15	Horseback riding	6	16	9	31	0.9
16	Sailing	9	16	5	30	0.9
17	Yatching	12	12	3	27	0.8
18	Water Skiing	12	10	3	25	0.7
19	Camp fire	12	8	5	25	0.7
20	Bicycle ride	0	10	3	22	0.6
					3,523	100%

Weighted activity scores:

The activity weights as calculated indicate the activities most desired by the users of the campgrounds; it is now possible to take into account the campers preference for each different campground activity. The activity weights calculated in Table 17 are used to determine the weighted activity scores for each activity offered in the campgrounds studied. In order to obtain the figures of Table 18, the recreational activity grades found in Table 16 are multiplied by the weights shown in Table 17.

TABLE 18

Weighted activity Scores

	Swimming	Fishing	Organized activities	Hiking	Organized sports	Hunting	Canoeing	Tennis	Golf	Row boating	Ski	Sun bathing	Horseback riding	Sailing	Yatching	Water ski	Camp fire	TOTAL
Mare du Sault	00	40	07	13	00	00	06	00	00	05	00	02	00	00	00	00	01	.74
Stoneham	69	20	07	00	04	00	03	00	03	05	00	02	02	00	00	00	01	1.16
Mont Orford	69	20	07	13	00	00	03	00	05	02	02	02	01	01	00	00	01	1.26
Barrière John	00	40	00	13	00	07	00	00	00	00	00	00	00	00	00	00	01	.61
Etang Truite	00	40	00	13	00	07	06	00	00	05	00	02	00	00	00	00	01	.74
Port Daniel	00	40	00	13	00	07	00	00	00	00	00	00	00	00	00	00	01	.61
Lac Rimouski	69	40	00	13	04	07	06	00	00	05	00	04	00	01	01	01	01	1.52
Lac Monroe	69	40	07	13	04	00	06	00	00	05	02	04	00	01	01	01	01	1.54
Lac La Vieille	69	40	00	13	00	07	06	00	00	05	00	04	00	01	01	01	01	1.48
Lac Lajoie	35	20	00	13	00	00	06	00	00	05	02	02	02	02	02	01	01	.91
Lac Bellevue	69	40	00	13	00	07	06	00	00	05	00	02	00	00	00	00	01	1.43
Lac Normand	69	40	00	13	00	07	06	00	00	05	00	04	02	00	00	00	00	1.46
Lac du Milieu	69	20	00	13	00	00	06	00	00	05	00	04	00	00	00	00	01	1.18
Lac d'Argenson	69	40	00	13	00	00	06	00	00	05	00	04	00	02	00	00	01	1.40
Lac Albanel	00	40	00	13	00	00	06	00	00	05	00	02	00	00	00	00	01	.67
Rivière Chalifour	35	40	00	13	00	00	06	00	00	05	00	02	00	00	00	00	01	1.02
Moisie	35	40	00	06	00	00	00	00	00	00	00	02	00	00	00	01	00	.84
Lac Arthabaska	00	40	00	00	00	00	03	00	00	02	00	00	00	00	00	00	01	.46
La Loutre	35	20	00	00	00	00	06	00	00	05	00	02	00	01	01	00	00	.70
Belle Rivière	69	40	00	00	00	00	06	00	00	05	00	04	00	01	01	00	01	1.27
Rivière Ecorces	00	40	00	00	00	00	06	00	00	05	00	02	00	00	00	00	01	.54
Rivière Matane	00	20	00	00	00	00	00	00	03	00	00	00	02	00	00	00	01	.26
Oka	69	20	00	06	00	03	03	00	03	02	00	04	01	02	02	01	01	1.17
Voltigeurs	35	00	00	06	09	03	03	00	05	02	00	02	01	00	00	00	01	.67
La Sablonnière	35	40	00	13	00	07	06	00	00	02	02	04	00	00	00	00	01	1.10
Lac Dozois	69	40	00	06	00	07	06	00	00	05	00	04	00	00	00	00	01	1.38
Lac Savary	35	40	00	06	00	00	00	00	00	05	00	00	00	00	02	00	01	.89
Dollard des Ormeaux	35	20	07	06	00	07	06	00	00	05	00	04	02	02	02	01	01	.98

Adjusted scores:

The above table lists the weighted activity scores determined for each of the 28 campgrounds selected. These values are then standardized around a mean of 0 with a standard deviation of 1; then, in order to make these values comparable with values obtained previously for each factor, it is necessary to adjust these values around a mean of 100 and a standard deviation of 40., such as shown in the following table.

TABLE 19

Standardized and Adjusted Activity Scores

	Total weighted activity scores $\bar{x}$ = 1.00 s.d. = .358	Scores standardized $\bar{x}$ = 0.00 s.d. = 1.00	Adjusted scores $\bar{x}$ =100 s.d. = 40
Lac Dozois	1.38	1.06	142.41
Belle Rivière	1.27	.75	130.00
Moisie	.84	- .45	82.00
Lac Albanel	.67	- .92	63.25
Rivière Chalifour	1.02	.06	102.43
Lac Argenson	1.40	1.12	144.85
Lac Normand	1.46	1.28	151.20
Lac Savary	.89	- .31	87.67
Rivière Matane	.26	-2.07	17.26

Table 19 (Cont'd)

	Total weighted activity scores x̄ = 1.00 s.d. = .358	Scores standardized x̄ = 0.00 s.d. = 1.00	Adjusted scores x̄ =100 s.d. = 40
Rivière des Ecorces	.54	-1.28	48.84
Lac Arthabaska	.46	-1.51	39.68
Lac Lajoie	.91	- .25	90.03
Lac La Vieille	1.48	1.34	153.69
Lac Monroe	1.54	1.51	160.44
Lac Bellevue	1.43	1.20	148.01
Port Daniel	.61	-1.09	56.42
Lac Rimouski	1.52	1.45	158.00
La Sablonniere	1.10	.28	111.20
Voltigeurs	.67	- .92	63.20
Mont Orford	1.26	.73	129.21
Oka	1.17	.45	118.00
Stoneham	1.16	.45	118.00
Mare du Sault	.74	- .73	70.81
Barrière John	.61	-1.09	47.52
Etang à la Truite	.74	- .73	70.81
La Loutre	.70	- .84	66.42
Lac du Milieu	1.18	.50	120.00

Calculation of the Attraction Index

The index of camping quality for each campground is a weighted combination of its scores on the individual variables. It is however important to note that the previous studies apply to the average park visitor, and that when the value defined for the average visitor is applied to specific campgrounds it is necessary to make the assumption that such value is interpersonally valid. Only then, can we add up these different values. The composite index for each park is the sum of the four scores, as shown in Table 20 below.

TABLE 20

Attraction Index

	Natural Characteristics	Water	Services	Activities	TOTAL
Lac Dozois	173.29	24.46	72.12	142.41	412.28
Belle Rivière	157.56	28.65	76.03	130.00	392.24
Moisie	158.64	25.44	149.28	82.00	415.36
Lac Albanel	158.64	16.40	88.00	63.25	326.29
Rivière Chalifour	59.50	24.88	76.03	102.43	262.44
Lac d'Argenson	156.75	30.10	61.61	144.85	393.31
Lac Normand	144.61	18.72	61.61	151.20	376.14
Lac Savary	158.64	18.72	61.61	87.67	326.64
Rivière Matane	38.09	4.84	101.69	17.26	161.80
Rivière des Ecorces	114.24	8.39	90.85	48.84	262.92
Lac Arthabaska	119.79	10.25	76.03	39.68	245.75
Lac Lajoie	104.04	30.85	76.03	90.03	360.95
Lac La Vieille	178.16	27.31	90.42	153.69	449.58
Lac Monroe	133.28	32.80	150.06	160.44	476.58

Table 20 (Cont'd)

	Natural Characteristics	Water	Services	Activities	TOTAL
Lac Bellevue	168.00	22.65	61.61	148.01	400.27
Port Daniel	184.55	24.23	84.40	56.42	349.59
Lac Rimouski	187.80	24.70	61.61	158.00	432.10
La Sablonnière	116.01	27.44	61.61	111.20	316.31
Voltigeurs	13.37	4.93	165.27	63.20	246.77
Mont Orford	210.44	30.57	171.26	129.21	541.48
Oka	48.02	32.80	76.03	118.00	274.85
Stoneham	39.40	25.26	168.00	118.00	350.66
Mare du Sault	150.01	8.39	168.00	70.81	397.21
Barrière John	198.59	4.94	90.82	47.52	341.87
Etang Truite	121.41	27.12	61.21	70.81	280.55
La Loutre	143.56	31.22	156.49	66.42	397.69
Lac du Milieu	143.56	28.80	98.03	120.00	390.39

The last column of Table 20 shows that the campgrounds are graded according to the value of their recreative attraction index. For example Mont Orford with the highest value is the most interesting to visit.

Let us consider at this point a case where we use the attraction index to define the substitution effect for one particular county (see page 67, paragraph 4). Let us take the county of argenteuil with the six campgrounds that are located within a radius of 200 miles measured from the center of the county.

Table 21 lists these six campgrounds along with their respective distances and attraction indices. It is followed by the numerical value of the equation mentioned above. This gives the substitution effect index for this county. The same formula was applied to all the other counties of the province and the substitution effect indices for these counties are listed in Table 22.

The value of these indices indicates how much the citizens of one county will be inclined to remain in the vicinity of their point of origin when they go camping.

TABLE 21

Campgrounds located within a radius of 200 miles from the center of the county of Argenteuil

Campgrounds	Distance	Attraction Index
Lac La Vieille	144	449.49
Lac Savary	144	326.64
Lac Lajoie	48	390.95
Lac Munroe	60	476.58
La Sablonnière	60	316.31
Oka	36	274.85

From these data the value of the substitution variable for the county of Argenteuil is determined by means of the following gravity formula.

$$\chi_{ij} = \sum_{i=1}^{n} \frac{\log_{10} s_i}{d_{ij}}$$

$$\chi_{ij} = \frac{\log_{10}\ 449.49}{144} + \frac{\log_{10}\ 326.64}{144} + \frac{\log_{10}\ 360.95}{48} +$$

$$\frac{\log_{10}\ 476.58}{60} + \frac{\log_{10}\ 316.31}{60} + \frac{\log_{10}\ 274.85}{36} = 245.52$$

$$\chi_{ij} = 0.24552 = \text{Substitution effect variable.}$$

For instance, the people of Argenteuil with an index of 0.24552 would be expected to camp closer to home than the people of Abitibi. These people, with an index of

.10887 will have to find the needed facility outside of the immediate vicinity of their county.

The Model

In the previous section we have defined the different variables and explained how these were arrived at. The 1971 data plotted on an arithmetic scale give a curvilinear distribution of the points. It was observed that when plotting the same data on a double logarithmic scale the points had a tendency to group themselves along a straight line. This type of curve proved to be more useful for further analysis.

Such an equation, where we used the double-logarithm form, is a special case of the more general technique of transformation of variables to achieve straight-line relationships. In that instance, the dependent variable Y and the independent variables χ_1 to χ_6 are transformed into log Y and log χ_1 to log χ_6 and a linear regression equation was then calculated, using the transformed value in place of the original data. Such an equation where we used the double-logarithmic values is linear in its parameters but curvilinear in its variables; hence there is continuous change in the dependent variable depending on the level at which a particular independent variable happens to be entered into the equation. A double logarithmic transformation was used to obtain the equation form shown below for each campground. In this equation, the dependent variable is the number of visitors originating from the different counties, and the independent variables represent the values of the different socioeconomic variables that characterize the counties located within 200 miles of each sample campground. The data used in this analysis indicate that a great majority of the visitors originate within 200 miles from each destination area. The form of the equation is:[27]

$$\log (Y + 1.0) = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7$$

where

Y_1 = The number of visitor-days from a particular county of origin

X_1 = The population of the county of origin of the visitors

X_2 = The per capita income in the county of origin of the visitors

X_3 = The approximate cost of the round trip from the county of origin to the campground

X_4 = The average age of the heads of households in the county of origin

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[27]In this equation we added 1.0 to the value of each dependent variable for each observation. Such a constant is necessary as in some cases there is no visitation originating from a particular county and the logarithm of zero is undefined.

X_5 = The average age of the inhabitants in the county

X_6 = The degree of urbanization of the county of origin

X_7 = The substitution effect variable constructed to reflect the competitive effect of other campgrounds
(this was extensively explained in page 67 above).

The following table indicates the values of the dependent and independent variables for each of the 72 counties of the Province of Quebec.

TABLE 22

Values of the Dependent and Independent Variables

Counties	Dependent variables number of day-use in different campgrounds			Independent variables								
	La Mare du Sault	Lac La Vieille	Mont Orford	Population	Average per capita income	Round trip cost of travel from La Mare du Sault	Round trip cost of travel from Lac La Vieille	Round trip cost of travel from Mont Orford	Rural = 1 Suburd = 2 Urban = 3	Average age of head of household	Average population age	Substitution effect
1- **Abitibi**	0000	094	0104	01160	1780	189.24	061.56	157.36	1	43.81	23.87	.10887
2- **Argenteuil**	0000	009	0000	00295	2080	093.56	045.60	050.16	1	46.78	29.75	.24552
3- **Arthabaska**	0041	004	0058	00516	1440	046.74	104.88	020.52	1	44.69	26.52	.33984
4- **Bagot**	0006	012	0018	00236	1180	059.28	091.20	022.80	1	45.91	27.21	.30538
5- **Beauce**	0034	000	0020	00637	1270	038.76	139.08	041.04	1	45.91	26.10	.23034
6- **Beauharnois**	0016	018	0102	00519	2130	085.50	077.52	036.48	2	43.91	27.62	.25132
7- **Bellechasse**	0018	002	0008	00212	0970	039.90	136.80	050.18	1	49.21	28.24	.35168
8- **Berthier**	0000	000	0014	00257	1160	059.28	084.36	047.88	1	47.00	29.46	.28170
9- **Bonaventure**	0004	000	0000	00425	1190	152.76	247.38	164.16	1	47.42	26.22	.29231
10- **Brome**	0000	000	0000	00141	1330	072.96	093.48	004.56	1	49.73	31.58	.36860

TABLE 22 (cont'd)

11-	Chambly	0016	074	0994	02230	3120	072.96	075.24	025.08	2	41.96	25.84	.32336
12-	Champlain	0016	017	0068	01082	2230	043.32	100.32	059.28	2	45.18	27.28	.23037
13-	Charlevoix est	0000	000	0000	00161	1450	050.16	155.04	086.64	1	46.16	26.60	.21325
14-	Charlevoix ouest	0031	002	0004	00136	1170	042.18	123.12	077.52	1	47.23	27.74	.23116
15-	Chateauguay	0007	020	0012	00564	2900	084.36	077.52	036.48	2	43.13	26.88	.23886
16-	Chicoutimi	0072	000	0049	01596	2550	027.36	169.86	100.32	2	43.46	24.06	.32133
17-	Compton	0000	004	0000	00199	1480	075.24	107.16	015.96	1	47.90	28.14	.22768
18-	Deux-Montagnes	0000	002	0082	00433	2340	084.36	059.28	036.48	1	45.01	27.72	.38233
19-	Dorchester	0000	000	0006	00314	0990	034.20	134.52	045.60	1	47.98	27.05	.22355
20-	Drummond	0035	004	0062	00655	1730	052.44	091.20	020.52	1	44.81	26.69	.37865
21-	Frontenac	0000	000	0024	00261	1150	063.82	117.04	031.92	1	46.98	26.23	.24173
22-	Gaspé-Est	0000	000	0000	00395	1240	177.84	271.32	273.60	1	46.80	24.94	.11683
23-	Gaspé-Ouest	0000	000	0000	00159	1760	132.24	230.28	232.56	1	44.62	25.13	.15717
24-	Gatineau	0012	264	0032	00550	2140	116.28	041.04	072.96	2	44.39	25.82	.21320
25-	Hull	0006	062	0004	01013	2500	111.92	041.04	072.96	1	41.84	25.67	.21030
26-	Huntingdon	0000	000	0012	00153	1560	093.48	084.36	041.04	1	47.99	30.52	.18735
27-	Iberville	0010	000	0082	00200	1740	079.80	079.80	020.52	1	44.74	26.44	.20287
28-	Joliette	0003	000	0046	00506	1610	072.96	084.36	045.60	1	44.85	28.05	.30651

TABLE 22 (cont'd)

29-	Kamouraska	0000	000	0020	00251	1130	057.00	156.18	086.64	1	48.74	28.49	.17729
30-	Labelle	0000	029	0011	00301	1220	120.84	015.96	072.96	1	44.40	26.43	.28341
31-	Lac Saint-Jean Est	0030	000	0008	00455	2110	030.02	171.00	100.32	1	43.28	23.52	.40822
32-	Lac Saint-Jean Ouest	0012	000	0000	00568	1320	036.48	177.84	114.00	1	44.30	24.05	.32200
33-	Laprairie	0000	000	0194	00558	2340	079.52	072.96	027.36	2	41.61	25.68	.26839
34-	L'Assomption	0037	000	0057	00574	2510	068.40	075.24	086.48	1	43.08	25.58	.31135
35-	Lévis	0073	000	0150	00621	2130	025.08	125.40	100.32	2	45.26	26.68	.28318
36-	L'Islet	0008	000	0008	00231	1230	045.60	144.78	077.52	1	48.15	27.04	.19919
37-	Lotbinière	0008	000	0017	00264	1070	029.64	111.72	050.16	1	48.62	27.35	.30572
38-	Maskinongé	0000	000	0000	00209	1370	043.32	090.06	052.44	1	46.51	28.68	.25503
39-	Matane	0003	000	0010	00276	1220	111.72	209.76	196.08	1	46.58	25.91	.14423
40-	Matapédia	0000	000	0010	00263	1110	116.28	214.32	205.20	1	47.68	24.72	.22912
41-	Mégantic	0085	005	0069	00553	2110	043.32	116.28	038.76	1	45.04	26.33	.18552
42-	Missisquoi	0000	000	0143	00340	1770	084.36	085.50	018.24	1	45.82	28.76	.23524
43-	Montcalm	0000	006	0000	00190	1330	079.80	084.36	041.04	1	48.57	29.84	.26507
44-	Montmagny	0000	000	0000	00261	1280	063.84	137.94	072.96	1	47.19	27.68	.22344
45-	Montmorency	0065	000	0000	00251	1860	027.36	082.08	084.36	2	47.03	28.82	.25599
46-	Montréal(Ile Jésus)	0468	338	2479	22615	2800	075.24	066.12	027.36	3	43.29	29.96	.33263

TABLE 22 (cont'd)

47-	Napierville	0000	000	0028	00118	1340	061.56	077.52	034.20	1	45.23	26.54	.19937
48-	Nicolet	0000	000	0022	00296	1320	050.16	101.46	036.48	1	48.62	29.55	.28473
49-	Papineau	0005	004	0035	00300	1620	107.16	049.02	059.28	1	46.90	28.59	.21312
50-	Pontiac	0000	000	0010	00195	1460	139.08	057.00	086.64	1	48.32	28.89	.14821
51-	Portneuf	0012	000	0000	00507	1720	027.36	132.24	068.40	1	46.08	27.83	.26476
52-	Québec	1074	025	726	04154	2470	018.74	127.68	060.80	3	44.00	28.77	.33262
53-	Richelieu	0031	000	0221	00488	2060	066.12	086.64	036.48	1	43.82	28.89	.21936
54-	Richmond	0012	012	0186	00391	2290	066.12	104.88	011.40	1	45.38	27.02	.28342
55-	Rimouski	0012	000	0018	00633	1530	091.20	189.24	177.84	2	45.70	26.01	.18422
56-	Rivière-du-Loup	0000	000	0034	00387	1400	066.12	166.44	100.32	2	47.58	27.24	.12003
57-	Rouville	0000	000	0162	00310	2410	070.68	072.96	018.24	1	45.06	27.63	.23678
58-	Saguenay	0008	000	0081	01271	3170	109.44	109.44	141.36	1	39.96	22.67	.08652
59-	Saint-Hyacinthe	0016	002	0240	00503	1640	066.12	079.80	025.08	1	44.83	29.85	.28251
60-	Saint-Jean	0021	028	0201	00429	2070	079.80	079.80	022.80	1	44.43	27.99	.20295
61-	Saint-Maurice	0043	004	0209	01109	2360	047.88	098.04	036.48	2	45.06	28.50	.20290
62-	Shefford	0029	000	0325	00696	1750	068.40	090.06	009.12	1	43.78	26.90	.32787
63-	Sherbrooke	0020	012	0887	01011	2070	070.68	100.32	004.56	3	43.88	28.16	.27001
64-	Soulanges	0000	000	0000	00110	1880	088.92	079.80	041.04	1	47.39	29.99	.21163

TABLE 22 (cont'd)

65- **Stanstead**	0012	007	0355	00368	1580	077.52	104.88	009.12	1	46.13	28.93	.35460
66- **Témiscamingue**	0000	064	0006	00578	1980	202.92	070.68	173.28	1	43.75	24.78	.10262
67- **Témiscouata**	0000	000	0000	00218	1110	079.80	180.12	077.52	1	47.58	25.33	.13637
68- **Terrebonne**	0016	036	0179	01366	2090	086.64	054.72	043.32	2	43.53	26.27	.25097
69- **Vaudreuil**	0000	004	0018	00377	3090	086.64	079.80	045.60	1	44.50	27.69	.20875
70- **Verchères**	0012	000	0178	00343	2530	075.24	075.24	025.08	1	43.35	26.53	.25038
71- **Wolfe**	0000	000	0000	00147	1160	054.72	114.00	025.08	1	47.47	26.98	.22136
72- **Yamaska**	0000	000	0010	00144	1200	057.00	099.04	029.64	1	49.06	29.75	.25182

Analysis of the Data

The S.P.S.S. multiple-regression analysis computer program[28] was used to estimate the regression coefficients. The S.P.S.S. multiple regression analysis is a computer program with automatic stepwise addition of variables to form a least squares equation. This program provides a means of choosing independent variables which will provide the best prediction possible with the fewest independent variables. Through the use of this stepwise-regression analysis, an independent variable is selected at each stage from all independent variables not presently in the equation. The independent variable selected for inclusion is that variable which will reduce to the greatest extent the unexplained variance around the mean of the dependent variable. It follows, of course, that the selected independent variable is the one that provides the largest increase in the coefficient of multiple determination (R^2).

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[28] Nie, Bent, and Hull "Statistical Package for the Social Sciences," op.cit., p. 208.

Level of Significance

In this study we apply a level of significance of 0.1 such as used by Little[29] and McCoy[30] in two studies of the same kind.

The significance level, which is predetermined, is a restricting criterion which will terminate the selection of the variables. To check the above, the significance of the observed value of F, which is the variance ratio, is calculated to explain the variance of the last variable included against the F distribution. That provides a judgment on the contribution made by each variable as though it had been the most recent variable entered, irrespective of its actual point of entry into the model. Any variable which provides a non-significant contribution is not added to the model.

According to Draper and Smith,[31] stepwise regression is the best of the variable selection procedures. However, stepwise regression can easily be abused by including irrelevant variables in the equation, since the inclusion

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[29] Little, "A Study of Factor Affecting Pleasure Travel to U.S.," op.cit., p. 198.

[30] Edward Wayne McCoy, "Analysis of the Utilization of Outdoor Recreation in Tennessee," op.cit., p. 39.

[31] M. R. Draper and H. Smith, Applied Regression Analysis (New York: John Wiley & Sons, Inc., 1966), p. 172.

of even one irrelevant variable will almost certainly increase R^2 due to chance fluctuation. It is therefore necessary to use sensible judgment in the initial selection of the variables.

Interpretation of Results

For the campgrounds studied in this model we obtain three equations, one for each campground. The different equations are shown in the following table. These equations show only the variables which have been found significant in the least square analysis.

TABLE 23

Final Regression Equation

Campgrounds	Equations	R^2 value	S value
La Vieille	$\log(Y+1.0)=0.43892 + 1.11236 \log \chi_1 -2.04462 \log \chi_3+1.11790 \log \chi_6-1.73302 \log \chi_7$	.67973	0.49919
Mont Orford	$\log(Y+1.0)=1.68015 + 1.70128 \log \chi_1 -1.30490 \log \chi_3-1.18291 \log \chi_7$	.55988	0.65651
La Mare du Sault	$\log(Y+1.0) - 15.94958 + 1.09780 \log \chi_1 -2.17193 \log \chi_3-8.52690 \log \chi_4$	.65031	0.49720

In these equations:

Y = The estimated number of visitor-days from a particular county of origin at the different campgrounds

χ_1 = The population of the county of origin of the visitors

χ_3 = The cost of the round trip from the county of origin to the campground

χ_4 = The average age of heads of households in the county of origin

χ_6 = The degree of urbanization of the county of origin

χ_7 = The substitution effect variable constructed to reflect the competitive effect of the other campgrounds.

In the above equations, the coefficients of the population of the county of origin and the coefficient of the variable that reflects the nature of the county of origin indicate that each successive increase in value of those variables results in ever smaller increases in visits, assuming that all other variables remain constant. However, the coefficient of the cost of the round trip, the regression coefficient of the average age of the heads of households, and the regression coefficient of the substitution effect variable, indicate that each successive increase in value of these variables results in ever smaller decreases in visits to the campgrounds, when all other variables are taken as constant.

In a subsequent analysis a check was made to discover if the different equations of Table 23 are statistically different from one another. For example, a check was made for a significant difference between the equation of Lac La Vieille and that of Mont Orford.

The method of achieving this is as follows:

1o) The coefficients in the first equation are replaced by the coefficients in the second equation.

2o) With the new coefficients in place we calculate the projected values for each county.

3o) Using the original value found for each county and the second set of values obtained after substitution of the coefficients for the same counties, we run a least squares analysis and obtain the following equation:

$$X = a + by$$

where

X = Estimated values before substitution

y = Values after substitution

4o) It is a known fact that if the two sets of results are identical we will get a regression line at exactly 45° with an origin at 0.

5o) We then verify whether the coefficients a and b of the equation shown in step No. 3 are significantly different from 0 and 1 which we normally have in any linear curve at 45°. In doing so, if we find that:

a) $a = o$ and $b = 1$, we conclude that the equations are identical.

b) $a \neq o$ and $b = 1$, we conclude that the equations are parallel.

c) a = o and b ≠ o, we conclude that even if the origin is the same the equations are different.

d) a ≠ o and b ≠ o, we conclude that the equations are different.

6o) In order to verify this we used the well known "t" test below:

$$t = \frac{a - a_o}{S_a} \qquad \text{and} \qquad t = \frac{b - b_o}{S_b}$$

where a and b are the two coefficients obtained in the equation shown in step 3.

Using the above principles and applying the "t" test we may now proceed to verify if the equations of Table 23 are statistically different. Let us compare first the equation of Lac La Vieille with that of Mont Orford using the data below computed from the least squares analysis.

$n = 33$

$\Sigma x_1 = 819.26$ $\quad\quad$ $\Sigma y_1 = 976.84$

$\Sigma x_1^2 = 67351.19$ $\quad\quad$ $\Sigma y_1^2 = 102651.95$

$\bar{x} = 24.83$ $\quad\quad$ $\bar{y} = 29.60$

$$\Sigma x_1^2 - [(\Sigma x_1)(\bar{x}_1)] = x_{00} = 47012.$$

$$\Sigma x_1^2 - [(\Sigma y_1)(\bar{y}_1)] = S_{11} = 73730.38$$

$$\Sigma x_1 y_1 - [(\Sigma x_1)\bar{Y}_1)] = S_{01} = 51923.28$$

$$b = \frac{S_{01}}{S_{11}} = \frac{51923.28}{73730.38} = 0.72$$

$$a = \bar{x}_1 - [(b)(\bar{Y}_1)] = 24.83 - (.72 \times 29.60) = 3.51$$

Residual sum of squares $R_{oo} = S_{oo} - b\, S_{01} = 47012 - (0.72 \times 51923.28) = 9.62$

In the above:

n = number of counties

x_1 = Value obtained before substitution

y_1 = The value obtained after substitution

We just verify the null hypothesis $H_1 : a = 0$ against alternative $a \neq 0$ at a level of significance .01.

$$t = \frac{a - a_o}{S_a}$$

where S_a is the estimated standard error of a, given by:

$$S_a = \sqrt{\left(\frac{1}{n} + \frac{\bar{x}^2}{S_{11}}\right) \frac{Roo}{n-2}} = \sqrt{\left(\frac{1}{33} + \frac{876.16}{73730.38}\right) \frac{9.62}{31}} = 0.11$$

$$t = \frac{3.51 - 0}{0.11} = 31.91$$

The null hypothesis is then rejected, as 31.91 is much larger than 1.64, which, in conformity with table of t distribution, is the value of "t" with a level of significance of .10 when n = 33.

We now verify the null hypothesis H_2 : b = 1 against the alternative b ≠ 1 at a level of significance .01.

$$t = \frac{b - B_o}{S_b}$$

where S_b is the estimated standard error of b given by:

$$S_b = \sqrt{\frac{Roo \;/\; n-2}{S_{11}}} = \sqrt{\frac{9.62 \;/\; 31}{73730}} = .0065$$

$$t = \frac{0.72 - 1}{.0065} = 43.07$$

The null hypothesis is then rejected as 43.07 is much larger than 1.64 which in conformity with table of t distribution is the value of t with a level of significance of .10 when n = 33. We then conclude that the equations are different.

Let us now see if there is a significant difference between the equation for Mont Orford and that for La Mare du Sault.

Here again, we obtain two sets of estimations as explained above from which we have the following:

$n = 55$

$\Sigma x_2 = 373.14$ $\qquad$ $\Sigma Y_2 = 2548.43$

$\Sigma x_2^2 = 12931.28$ $\qquad$ $\Sigma Y_2^2 = 2335880.17$

$\bar{X}_2 = 46.35$ $\qquad$ $\bar{Y}_2 = 6.78$

$$\Sigma Y_2^2 - [(\Sigma Y2)(\bar{y}_2)] = S_{00} = 2217760.40$$

$$\Sigma X_2^2 - [(\Sigma x_2)(\bar{x}_2)] = S_{11} = 10401.40$$

$$\Sigma x_2 y_2 - [(\Sigma x2)(\bar{y}_2)] = S_{01} = 116273.58$$

$$b = \frac{S_{01}}{S_{00}} = \frac{116273.58}{47011} = 2.47$$

$$a = \bar{y}_2 - b\,\bar{x}_2 = 46.35 - 11.18\ (6.78) = 29.45$$

Residual sum of squares $R_{00} = S_{00} - b\ S_{01}$, =

$2217760.40 - 11.18\ (116273.58) = 938757.43$

In the above:

n = number of counties

x_2 = values obtained before substitution

y_2 = values obtained after substitution.

We first verify the null hypothesis $H_1 : a = 0$ against the alternative $a \neq 1$ at a level of significance .01

$$t = \frac{a - a_o}{Sa}$$

where S_a is the estimated standard error of "a" given by:

$$S_a = \sqrt{\left(\frac{1}{n} + \frac{\bar{x}^2}{S_{11}}\right) \frac{Roo}{n-2}} = \sqrt{\left(\frac{1}{55} + \frac{45.96}{2217760.40}\right) \frac{938757.41}{53}} =$$

17.4

$$t = \frac{29.45 - 0}{17.4} = 1.06$$

The null hypothesis is then accepted and we may conclude that the origins are similar.

We now verify the null hypothesis $H_2 : b = 1$ against the alternative $b \neq 1$ at a level of significance .01.

$$t = \frac{b - Bo}{Sb}$$

where $S_b = \sqrt{\frac{Roo / n-2}{Soo}} = \sqrt{\frac{938757.40/53}{2217760.4}} = 0.089$

$$t = \frac{2.47 - 1}{.089} = 15.30$$

The null hypothesis is then rejected, as 15.30 is much larger than 1.64, which, in conformity with table of t distribution, is the value of t with a level of significance of .10 when n = 55. We then conclude that even if the origin is the same, the equations are different.

From the above, it must be inferred that the equations corresponding to the three campgrounds under study are not similar.

<u>Data Used in Projecting Visitation Estimates for the Years 1975 and 1980</u>

The estimation of future recreation participation at the campgrounds studied requires the projection of values for the independent variables included in the estimating model.

In this type of model, two variables are liable to change over the period of time considered in the present study: (a), the population of the county of origin X_1, and (b), the mean income per capita of the county of origin X_2. Other variables likely to change in the same lapse of time are significant in none of the equations. However, since no projection of the future value of these variables is available on a county basis in Canada, it was necessary, in this study, to estimate changes expected to occur in the next ten years. It was first assumed that the average age of the head of household and the average age of the population would likely change very slowly, and that over a period of ten years, such variables would remain relatively stable. It was therefore decided that the 1971 values would be used in the projections. The statistics show that in the last ten years both the population and the income distribution of the population have changed considerably. It was therefore necessary to estimate changes in these two variables for the forthcoming decade. The following method was used.

It was first assumed that there is a simple linear relationship between the value of these two variables and time. Using this relationship, a linear equation was then developed with the use of the least squares method for each of the 72 counties in the Province of Quebec.

$$Y_i = a - b\, x_j$$

where

Y_i = population of the origin county

x_j = year for which we are interested in estimating the population

a and b = coefficients

From the equations thus obtained estimates of future population and future income for the 72 counties were calculated. The corresponding regression coefficients are shown in the following table, along with the projection for 1975 and 1980.

TABLE 24

Projected Population of the Counties of Origin

County	Regression slope (a)	Partial regression coefficient (b)	Projected population in 1975 (00)	Projected population in 1980 (00)
Abitibi	1153.200	.800	1246.0	1212.0
Argenteuil	343.600	-4.000	279.0	259.0
Arthabaska	475.400	3.500	531.4	548.9
Bagot	224.400	1.000	240.4	245.4
Beauce	663.400	-2.100	629.8	619.3
Beauharnois	530.800	-0.900	516.4	511.9
Bellechasse	283.2	-5.9	188.8	159.3
Berthier	292.2	-2.9	245.3	231.3
Bonaventure	460.6	-2.9	414.2	399.7
Brôme	148.0	-0.6	138.4	135.4
Chambly	1472.0	63.6	2489.6	2807.6
Champlain	1211.4	-10.6	1041.8	988.8
Charlevoix est	175.8	-1.2	156.6	150.6
Charlevoix ouest	160.6	-2.0	128.6	118.6
Chateauguay	335.2	19.2	642.4	738.4
Chicoutimi	1686.6	-7.2	1571.4	1535.4
Compton	264.6	-5.6	175.0	147.0
Deux-Montagnes	338.0	8.0	466.0	506.0
Dorchester	377.4	-5.2	294.2	268.2
Drummond	612.4	3.7	671.6	690.1
Frontenac	332.2	-5.9	237.8	208.3

Table 24 (Cont'd)

County	Regression slope (a)	Partial regression coefficient (b)	Projected population in 1975 (00)	Projected population in 1980 (00)
Gaspé-est	458.9	-5.3	374.1	347.6
Gaspé-ouest	231.0	-6.0	135.0	105.0
Gatineau	539.8	0.4	546.2	548.2
Hull	814.6	17.3	1091.4	1177.9
Huntington	158.2	-0.4	151.8	149.8
Iberville	191.4	0.8	204.2	208.2
Joliette	475.4	2.6	517.0	530.0
Kamouraska	293.6	-3.5	237.6	220.1
Labelle	306.4	-0.4	300.0	298.0
Lac Saint-Jean est	476.6	-1.7	449.4	440.9
Lac Saint-Jean ouest	661.0	-7.6	539.4	159.6
Laprairie	303.6	21.3	644.4	1252.3
L'Assomption	397.6	14.8	634.4	708.4
Lévis	532.6	7.5	652.6	690.1
L'Islet	267.6	-3.0	219.6	204.6
Lotbinière	330.2	-5.5	242.4	214.7
Maskinongé	225.2	-1.3	204.4	197.9
Matane	379.4	-8.5	243.4	200.9
Matapédia	401.6	-11.5	217.6	160.1
Mégantic	623.4	-5.8	530.6	501.6
Missisquoi	312.8	2.4	351.2	363.2
Montcalm	202.4	-1.0	186.4	181.4
Montmagny	280.4	-1.5	256.4	248.9

Table 24 (Cont'd)

County	Regression slope (a)	Partial regression coefficient (b)	Projected population in 1975 (00)	Projected population in 1980 (00)
Montmorency	274.6	-1.9	244.2	234.7
Montréal	19462.4	267.3	23739.2	25075.7
Napierville	120.8	-0.2	117.6	116.6
Nicolet	335.0	-3.2	283.8	267.8
Papineau	356.0	-4.6	282.4	259.4
Pontiac	216.8	-1.8	188.0	179.0
Portneuf	542.6	-2.9	496.2	481.7
Québec	3378.8	65.4	4425.2	4752.2
Richelieu	399.0	7.5	519.0	556.5
Richmond	456.4	-5.4	370.0	343.0
Rimouski	706.4	-6.0	610.4	580.4
Rivière-du-Loup	439.2	-4.4	343.4	346.8
Rouville	273.2	3.1	322.8	138.3
Saguenay	816.4	38.1	1426.0	1616.5
Saint-Hyacinthe	477.6	2.2	512.8	1277.7
Saint-Jean	404.6	2.1	438.2	488.7
Saint-Maurice	1178.6	-5.6	1089.0	1061.0
Shefford	577.2	4.2	644.4	665.4
Sherbrooke	837.0	14.7	1072.2	1145.7
Soulanges	108.0	.2	111.2	112.2
Stanstead	385.2	-1.4	362.8	355.8
Témiscamingue	654.0	-6.2	554.8	523.8

Table 24 (Cont'd)

County	Regression slope (a)	Partial regression coefficient (b)	Projected population in 1975 (00)	Projected population in 1980 (00)
Témiscouata	333.8	-9.6	180.2	132.2
Terrebonne	1053.8	26.3	1474.6	1606.1
Vaudreuil	295.0	6.9	405.4	439.9
Verchères	266.4	6.5	370.4	402.9
Wolfe	201.4	-4.5	129.4	106.9
Yamaska	175.6	-2.6	133.4	120.4

TABLE 25

Projected Income of the Counties of Origin

County	Regression slope (a)	Partial regression coefficient (b)	Projected income in 1975	Projected income in 1980
Abitibi	748.030	78.252	2000.06	2391.32
Argenteuil	817.121	97.238	2372.93	2859.12
Arthabaska	691.818	56.258	1591.95	1873.24
Bagot	602.424	46.293	1343.16	1574.58
Beauce	453.788	66.084	1511.13	1841.55
Beauharnois	1085.909	76.014	1292.23	2682.77
Bellechasse	469.091	41.678	1135.94	1344.33
Berthier	580.909	50.245	1384.83	1636.05
Bonaventure	406.818	61.643	1393.11	1701.32
Brôme	615.757	54.371	1485.70	1757.55
Chambly	1034.394	161.888	3624.60	4434.04
Champlain	758.333	117.308	2635.26	3221.80
Charlevoix est	603.106	70.766	1735.37	2089.19
Charlevoix ouest	527.121	54.930	1406.00	1680.65
Chateauguay	713.485	175.489	3521.30	4398.75
Chicoutimi	684.848	149.510	3077.01	3139.71
Compton	501.818	80.874	1795.80	2200.17
Deux-Montagnes	611.818	140.489	2859.64	3562.09
Dorchester	426.212	48.146	1196.55	1437.28
Drummond	793.484	70.105	1915.16	2265.69
Frontenac	448.182	58.357	1381.89	1817.59

Table 25 (Cont'd)

County	Regression slope (a)	Partial regression coefficient (b)	Projected income in 1975	Projected income in 1980
Gaspé-est	423.636	65.210	1467.00	1793.05
Gaspé-ouest	492.121	99.930	2091.00	2590.65
Gatineau	1354.000	62.000	2346.00	2656.00
Hull	787.424	131.678	2238.53	3552.66
Huntingdon	716.061	67.273	1792.49	2128.19
Iberville	871.515	62.587	1872.91	2185.84
Joliette	652.727	74.580	1846.01	2218.91
Kamouraska	360.909	65.629	1410.97	1739.12
Labelle	482.121	58.776	1422.54	1716.42
Lac Saint-Jean est	897.864	96.790	2428.50	2930.45
Lac Saint-Jean oeust	739.242	47.937	1506.23	1745.92
Laprairie	711.515	127.972	2759.07	3398.93
L'Assomption	564.394	156.119	3062.30	3842.89
Lévis	643.636	115.979	2499.30	3079.19
L'Islet	411.212	66.224	1524.32	1684.64
Lotbinière	348.333	63.077	1693.56	1672.95
Maskinongé	614.697	60.559	1583.64	1886.44
Matane	375.909	71.014	1512.13	1867.20
Matapédia	583.000	44.000	1287.00	1507.00
Mégantic	595.000	122.308	2551.93	3163.47
Missisquoi	957.727	58.042	1886.43	2176.61
Montcalm	462.576	69.476	1574.19	1921.57

Table 25 (Cont'd)

County	Regression slope (a)	Partial regression coefficient (b)	Projected income in 1975	Projected income in 1980
Montmagny	511.515	61.049	1488.30	1793.54
Montmorency	600.000	100.000	2200.00	2700.00
Montréal	1246.061	116.119	3103.96	3684.56
Napierville	504.697	69.790	1621.34	1970.29
Nicolet	385.455	75.315	1590.49	1967.07
Papineau	620.152	78.951	1883.37	2278.12
Pontiac	714.394	56.119	1612.30	1892.89
Portneuf	717.273	75.804	1930.14	2309.16
Québec	856.515	126.049	2873.36	3503.48
Richelieu	841.670	93.287	2334.26	2893.98
Richmond	873.940	111.573	2658.84	3216.97
Rimouski	473.182	85.664	1843.81	2272.13
Rivière-du-Loup	565.000	70.000	1685.00	2035.00
Rouville	500.455	156.084	2997.80	3778.22
Saguenay	344.545	231.993	4056.43	5216.40
Saint-Hyacinthe	798.636	63.287	1802.23	2127.66
Saint-Jean	1287.727	49.196	2074.86	2320.84
Saint-Maurice	750.606	126.189	2769.63	3400.57
Shefford	824.242	68.706	1923.54	2267.07
Sherbrooke	991.818	78.182	2242.73	2633.64
Soulanges	628.485	103.182	2279.40	2793.01
Stanstead	820.606	54.266	1688.86	1960.19
Témiscamingue	982.727	74.195	2169.85	2540.82

Table 25 (Cont'd)

County	Regression slope (a)	Partial regression coefficient (b)	Projected income in 1975	Projected income in 1980
Témiscouata	500.909	50.629	1310.97	1504.12
Terrebonne	718.939	106.189	2417.96	2948.91
Vaudreuil	722.727	187.273	3717.49	4655.46
Verchères	630.758	153.217	3082.23	3848.31
Wolfe	368.788	68.776	1469.20	1813.08
Yamaska	385.758	68.986	1489.53	1834.46

Method of Estimating Future Participation

As seen above we now have a particular equation which was developed for each of the three sample campgrounds. These equations may now be used to estimate the participation of the citizens from any of the counties located within a radius of 200 miles of each of the three campgrounds mentioned above. This radius of 200 miles was used in the present study because the data indicate that most visitors to campgrounds originate within that distance.

In order to estimate the participation for the years 1975 and 1980, the values for the independent variables for each county were inserted in each of the three equations developed above (page 135).

The results obtained through the solution of each equation for each county and a summation of these results gives an estimate of the total expected visitation for the campgrounds. The following tables show the estimated number of recreational visits to each of the three campgrounds during the peak of the summer season, that is, during the months of July and August. In order to estimate the number of visitations during these two months, the estimates for the two-week survey period during the same months were used. It was then possible to estimate the participation during that eight-week period, assuming that the survey is representative of that period.

TABLE 26

Projected Number of Recreation Visits to the Three Campgrounds During July and August From Within a 200 Miles Radius

	1972	1975	1980
Mont Orford	34780	40900	46933
Lac La Vieille	4152	4879	5211
La Mare du Sault	9340	10188	10758

General Application

In the Province of Quebec, none of the Provincial Parks is used exclusively for recreation and all of them are used simultaneously for the production of timber, mineraly and recreation. Furthermore due to sharp competition within these parks, it is very important to estimate the future demand for recreation in order to obtain the value of the area for recreational use. Such a value, ones established for recreation, may be compared with that already established for the alternative uses of the same area, namely: timber or mineral production.

For the population, the estimation of future demand is especially important, in three different interrelated aspects of outdoor recreation activities. First it is most important to know the quantity and quality of the land, water and other natural resources that will be needed in the future for outdoor activities. If this information is not known some time ahead, we may be assured that the most valuable land, if not all the land in provincial parks, will have been acquired by the forest and mining industries and that it will be extremely difficult to acquire areas for public use, when the need arises to establish recreation facilities. It is also possible that the water, air, and even the soil, could be spoiled, through pollution caused by industrial activities, to a much greater extent than by any use that could be made of the same areas for recreation purposes.

A second field in which future needs must be estimated as early as possible is that related to the recreation activities which are accessory to camping, such as fishing, hunting, hotels, etc. . . . It is impossible to imagine that a government could build a new recreation site when it is needed, and make available to the users abundant fishing, hunting or hiking facilities, if this has not been foreseen some time ahead of actual construction.

Finally the forecast must also include the major problem of availability of manpower for both the construction and operation of new campgrounds and recreation sites.

SUMMARY

The present study was undertaken to estimate campground participation in the Province of Quebec both in government and private campgrounds. In order to attain the result intended, a survey was first made in the city of Sainte-Foy, a suburb of the provincial capital. This was done by sending a questionnaire to every fifth family in the city, for a total of 1,700 households. The purpose was to find out which socioeconomic characteristics have a significant influence on the camping participation originating from this city. A total of 693 answers were received and subsequently analyzed by regression analysis. The results thus obtained indicated that with this type of model, it is very difficult to estimate further participation; yet it indicated quite clearly which socioeconomic characteristics are likely to have a significant influence on camping participation.

In this analysis, the "t" test is applied to the interval-scale variables to verify the null hypothesis that $\overline{X}_1 = \overline{X}_2$, where $\overline{X}_1$ is the mean value of the participants and $\overline{X}_2$ is the mean value of the non-participants. Upon going through the analytic procedure, it was found that the younger populations, the people with lower incomes and

those with larger families have a tendency to produce a larger number of camping days, whereas non-campers belong to the older populations with higher incomes and smaller families.

The chi-square test is applied to the nominal scale variables to verify the hypothesis that frequencies of participation are not influenced by the occupation of the participants. The analysis of the data indicated that there is no significant difference between the rate of participation of the people with different occupations, except for retired persons who show a clear tendency toward a lower participation.

In a second study we used the basic data on the participation of the population in different campgrounds as established by the governmental statistics for 1971. The purpose of this study was to define the relationships between campground participation and the socioeconomic characteristics of the people of each county.

Factor analysis is used to define the attraction index of the different campgrounds. It is a multivariate statistical method which makes it possible to consider a large number of interrelated variables and reduce them to a smaller number of factors.

By means of a stepwise regression analysis, the size and slope of the regression coefficients have been estimated for three campgrounds. In order to achieve this, the variables having the greatest influence on the degree of participation in campground attendance were first identified.

Then a double logarithmic equation was filled to the data obtained for three different campgrounds. An equation was developed which was later used to estimate future participation in camping at the three campgrounds. Using this equation with forecasted values for the independent variables for the years 1975 and 1980 indicated that the participation of the population is expected to increase by 17.60% and 34.92% for Mont Orford, 17.53% and 25.51% for Lac La Vieille, 9.02% and 15.21% for La Mare du Sault as compared with the 1971 participation.

CONCLUSIONS AND SUGGESTIONS FOR FURTHER STUDY

The present study is the first attempt to implement an econometric analysis in the field of outdoor recreation in the Province of Quebec. The use of campgrounds has developed very rapidly in recent years for both state-owned and private enterprises. As a result of this accrued activity, abundant data and statistics have been accumulated but have never been used for an analysis of the phenomenon and for an adequate forecast of the future use of campgrounds.

It is the author's belief that this first attempt has been successful in pointing out the most prominent factors which govern the use that the public presently makes of existing campgrounds. The present study went further and used these factors to estimate the future participation of the public in campground activities for 1975 and 1980.

However, there are some shortcomings which are listed below along with some recommendations for further studies.

1) Plenty of data concerning the campgrounds understudy had been collected, but none had been properly classified and made readily available. That is why we had to limit

our compilation to two-week sample periods for each campgrounds. Due to this limitation, we had to make the assumption that for the estimated number of recreational visits each week is representative of the month to which it belongs.

In the near future, the Department of Tourism, Fish and Game will use new registration forms which will permit the building of an improved data bank. This one would be not only most valuable to make readily available all information needed for future studies of this kind, but more complete, and more dependable, because it would be based on a sample covering a full season instead of a few weeks.

2) For the present study, future values of the different socioeconomic variables were needed. Since no projection of these variables was available on a county basis in Quebec, it was necessary to make our own estimates of the changes expected to occur in the next ten years.

Such projections could be improved through close cooperation between the Dominion Bureau of Statistics and the Department of Tourism, Fish and Game. Thus, it would be possible in the future to obtain better estimates on a county basis.

3) It is important to be very cautious when developing a prediction model because basic data used in the model change very rapidly due to technological improvements and other exogenous events. However, the author believes that

it is worth while to develop complete models for short periods of time in order to have adequate adaptation to changing conditions. It is further possible to have a continuous process of model revision as conditions change; that may mean more work and greater costs, although not an insurmountable task. It is even possible to develop simulation models for the various subsystems which could be dynamic in both time and space.

In addition to the analysis made in the present study, there are many aspects of recreation demand that require further investigation. For instance the present analysis deals with conditions which may be considered as entirely static because it was based on a sample survey made for different campgrounds at one point in time during which the consumer had at his disposal a specific supply of recreation opportunities. It has been assumed that the availability of facilities will gradually increase with the demand.

In this study those possible effects that a change in supply may have over a period of time on the participation of the people in recreational were not taken into account. It is possible that the future supply of outdoor recreation opportunities will be adequate to meet the estimated demand, nevertheless we are not sure that the supply will expand to meet the increased demand which was demonstrated in this study. Since this aspect of the question could not be included in the present study because of a lack of data, it is felt that as time goes on, more and more data will be made available, and any future analysis of recreational activities is bound to come to grips with the importance of the supply factors. That is why it is believed that any further studies should make use of the trends indicating the increasing amount of facilities, this would permit to obtain more precise results in future estimations.

In the present study a statistical relationship has been established between the actual participation of the people in campground activities and certain socioeconomic variables. After formulating this relationship, the best possible scientific computations were made of the future levels of the socioeconomic variables, and these were used as a basis for predicting future participation. In so doing it was assumed that in the future the same relationship between these variables and the participation will maintain.

It is suggested that, in a future study, a similar statistical relationship be established between participation and supply. After proper processing of the data some very interesting and useful information may result from such a research program.

It must be remembered that in the present study most of the variables were socioeconomic ones and thus impossible to change or control. This new aspect of the question is most interesting, especially for future planning, because the availability of supply is one of the only variables on which the decision maker has some control and thus may lead to a better use of campgrounds.

Along the same line of thought, the principle of "learning by doing" may be investigated to see how the increasing availability of recreational facilities will affect the ability of the individual through greater opportunities to practice. This is especially true of most sports and is bound to affect the eventual demand for this sort of facilities.

In the first part of the present thesis, the study was based on the socioeconomic characteristics particular to individuals within a single city. In the second part, the study was based on the socioeconomic characteristics particular to the population of specific geographical units (counties). It would be of great interest to use as the basis for a future study the characteristics particular to groups of individuals that make up the population of a country. The groups could be professional, ethnical, financial, religious . . . etc.

The results of such a study could add greatly to the knowledge of the needs of the population and be very useful in estimating the future demand for outdoor recreation.

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APPENDIX A

FACTOR DEFINED BY THE FACTOR ANALYSIS METHOD, THEIR VALUES, COMMUNALITIES AND FACTOR SCORE COEFFICIENTS

NOUMELLE ANALYSE FACTORIELLE 02/02/72 PAGE 8

FILE NONAME (CREATION DATE = 02/02/72)

FACTOR MATRIX USING PRINCIPAL FACTOR WITH ITERATIONS

	FACTOR 1	FACTOR 2	FACTOR 3
VAR004	0.54134	0.63296	-0.38913
VAR005	0.38818	0.47197	-0.00087
VAR006	0.65488	0.58175	-0.36739
VAR007	0.58856	0.63322	-0.24100
VAR008	0.32392	0.36990	-0.56065
VAR009	0.78980	0.03964	0.24621
VAR010	0.53985	0.24751	-0.24166
VAR011	-0.20594	0.25514	0.21545
VAR012	0.33829	0.46565	-0.04521
VAR013	-0.36996	0.81907	0.02342
VAR014	-0.01813	0.46745	0.06202
VAR016	-0.83481	0.26516	0.31467
VAR017	-0.59785	0.37231	0.35125
VAR018	-0.63789	0.34805	0.23350
VAR019	-0.72450	0.09209	0.25240
VAR020	0.85753	-0.21776	-0.02120
VAR021	-0.83481	0.26516	0.31467
VAR022	-0.71407	0.33665	0.17266
VAR023	-0.50313	-0.07551	-0.65176
VAR024	-0.63681	-0.19424	-0.71676
VAR025	-0.65614	-0.21458	-0.72458
VAR026	-0.87763	0.29360	-0.12638
VAR027	-0.87785	0.10060	-0.12033
VAR028	-0.64462	-0.25437	-0.62465
VAR029	-0.28795	0.34826	-0.38258

FILE NONAME (CREATION DATE = 02/02/72)

VARIABLE	COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
VAR004	0.84511	1	9.59034	57.8	57.8
VAR005	0.37344	2	3.67789	22.2	79.9
VAR006	0.90227	3	3.33129	20.1	100.0
VAR007	0.80545				
VAR008	0.55608				
VAR009	0.68597				
VAR010	0.41111				
VAR011	0.15392				
VAR012	0.33332				
VAR013	0.80829				
VAR014	0.22269				
VAR016	0.86623				
VAR017	0.61942				
VAR018	0.58256				
VAR019	0.59709				
VAR020	0.78322				
VAR021	0.86624				
VAR022	0.55304				
VAR023	0.68363				
VAR024	0.95701				
VAR025	1.00158				
VAR026	0.87241				
VAR027	0.79522				
VAR028	0.87299				
VAR029	0.35057				

NOUMELLE ANALYSE FACTORIELLE 02/02/72 PAGE 10

FILE NONAME (CREATION DATE = 02/02/72)

VARIMAX ROTATED FACTOR MATRIX

	FACTOR 1	FACTOR 2	FACTOR 3
VAR004	-0.17592	-0.03640	0.90157
VAR005	-0.00814	-0.26059	0.55269
VAR006	-0.27877	-0.10993	0.90137
VAR007	-0.15249	-0.18563	0.86472
VAR008	-0.23713	0.25315	0.66013
VAR009	-0.45083	-0.63489	0.28218
VAR010	-0.33978	-0.11592	0.53124
VAR011	0.37858	-0.09773	0.03240
VAR012	0.00700	-0.19600	0.54300
VAR013	0.74720	0.08915	0.49215
VAR014	0.30623	-0.09414	0.34647
VAR016	0.87569	0.15642	-0.27372
VAR017	0.78087	-0.01351	-0.09737
VAR018	0.75019	0.10913	-0.08866
VAR019	0.67250	0.16841	-0.34129
VAR020	-0.75126	-0.41917	0.20765
VAR021	0.87570	0.15642	-0.27372
VAR022	0.77497	0.20221	-0.10754
VAR023	0.06685	0.82365	-0.02750
VAR024	0.06963	0.96309	-0.15690
VAR025	0.06882	0.98228	-0.17879
VAR026	0.75234	0.54487	-0.09750
VAR027	0.64370	0.56143	-0.25626
VAR028	0.07337	0.89756	-0.24898
VAR029	0.26000	0.43579	0.30506

NOUMELLE ANALYSE FACTORIELLE 02/02/72 PAGE 11

FILE NONAME (CREATION DATE = 02/02/72)

FACTOR SCORE COEFFICIENTS

	FACTOR 1	FACTOR 2	FACTOR 3
VAR004	-0.53825	-1.47252	2.66338
VAR005	0.03009	-0.96861	1.03714
VAR006	-0.64535	-0.51069	0.95394
VAR007	-0.11750	-0.46813	1.62458
VAR008	-0.68889	0.56815	0.90274
VAR009	-0.76400	-1.96419	1.86111
VAR010	-0.78430	-0.74037	2.05202
VAR011	1.39230	0.08070	0.16954
VAR012	0.23971	-0.35388	0.83972
VAR013	1.71969	0.73783	-0.28186
VAR014	0.23917	-0.49275	0.66872
VAR016	1.38254	0.36052	-2.22840
VAR017	1.59370	-0.11069	-1.10721
VAR018	3.18497	-0.11798	-0.77155
VAR019	2.26452	0.30693	-3.47351
VAR020	-2.77755	-0.94988	2.31977
VAR021	2.35697	0.62948	-2.41526
VAR022	3.26238	0.53754	-1.53450
VAR023	1.55506	0.64168	-0.71194
VAR024	1.11117	1.30178	-1.21766
VAR025	1.33342	1.34912	-1.21156
VAR026	1.72460	0.71448	-0.95275
VAR027	1.09641	0.37849	-1.33761
VAR028	0.59241	1.33228	-1.25978
VAR029	0.60978	0.81500	0.61953

APPENDIX B

PARTICIPATION EXPECTED AT THE THREE CAMPGROUNDS STUDIED - YEARS 1975 AND 1980

MARE DU SAULT

COMTE	1975	1980
ABITIBI	2.5397	2.4638
ARGENTEUIL	1.2968	1.1951
ARTHABASKA	17.5212	18.1382
BAGOT	3.4755	3.5552
BEAUCE	25.2300	24.7463
BEAUHARNOIS	5.3145	5.2693
BELLECHASSE	3.4955	2.8913
BERTHIER	2.9235	2.7284
BONAVENTURE	0.6141	0.5913
BROME	0.6100	0.5955
CHAMBLY	62.1009	70.9536
CHAMPLAIN	39.4691	37.2710
CHARLEVOIX E	2.9933	2.8679
CHARLEVOIS O	2.8912	2.6461
CHATEAUGUAY	8.1031	9.4428
CHICOUTIMI	233.9826	228.1058
COMPTON	1.0196	0.8420
DEUX-MONT	3.9618	4.3366
DORCHESTER	9.8468	8.8951
DRUMMOND	17.2727	17.7814
FRONTENAC	2.4105	2.0791
GASPE EST	0.4417	0.4068
GASPE OUEST	0.4125	0.3131
GATINEAU	2.6430	2.6537
HULL	10.1688	11.0623
HUNTINGDON	0.5365	0.5287
IBERVILLE	1.9000	1.9409
JOLIETTE	6.2739	6.4473
KAMOURASKA	3.3094	2.0655

LABELLE	1.2574	1.2482
LAC ST JEANE	50.1098	49.1301
LAC ST JEANO	32.8789	8.6668
LAPRAIRIE	12.5525	26.0427
L ASSOMPTION	12.7287	14.3690
LEVIS	76.2828	81.0405
L ISLET	3.7019	3.4245
LOTBINIERE	9.6921	8.5115
MASKINONGE	5.1441	4.9784
MATANE	0.7862	0.6383
MATAPEDIA	0.5217	0.3733
MEGANTIC	19.3350	18.1788
MISSISQUOI	2.4930	2.5868
MONTCALM	1.4677	1.4245
MONTMAGNY	2.5122	2.4370
MONTMORENCY	15.4513	14.8264
MONTREAL	172.4875	187.4391
NAPIERVILLE	1.6680	1.6525
NICOLET	3.6853	3.4580
PAPINEAU	0.9560	0.8707
PONTIAC	0.2696	0.2555
PORTNEUF	40.0647	38.8244
QUEBEC	1493.2341	1614.7637
RICHELIEU	9.5121	10.2592
RICHMOND	4.8684	4.4799
RIMOUSKI	3.9483	3.7356
RIVIERE DU L	2.9920	3.0303
ROUVILLE	3.8542	1.5153
SAGUENAY	21.1988	24.3196
ST HYACINTHE	7.7165	21.0636
SAINT- JEAN	4.6645	4.7932
ST MAURICE	34.0985	33.1371
SHEFFORD	11.2865	11.6913

SHERBROOKE	18.0361	19.4069
SOULANGE	0.4715	0.4761
STANSTEAD	2.9347	2.8726
TEMISCAMING	0.9088	0.8532
TEMISCOUATA	0.9799	0.6971
TERREBONNE	17.6157	19.3407
VAUDREUIL	3.5322	3.8687
VERCHERES	5.4323	5.9340
WOLFE	1.5732	1.2813
YAMASKA	1.1242	1.0042

LAC LA VIEILLE

COMTE	1975	1980
ABITIBI	78.1393	75.7713
ARGENTEUIL	6.6734	6.1435
ARTHABASKA	1.4157	1.4662
BAGOT	0.9374	0.9591
BEAUCE	1.8865	1.8499
BEAUHARNOIS	9.3147	9.2344
BELLECHASSE	0.2456	0.2026
BERTHIER	1.2996	1.2118
BONAVENTURE	0.2411	0.2320
BROME	0.3476	0.3392
CHAMBLY	36.7917	42.1109
CHAMPLAIN	13.9716	13.1834
CHARLEVOIX E	0.3681	0.3525
CHARLEVOIS O	0.4122	0.3768
CHATEAUGUAY	12.9714	15.1463
CHICOUTIMI	4.2219	4.1144
COMPTON	0.7891	0.6499
DEUX-MONT	3.2051	3.5126
DORCHESTER	0.9112	0.8220
DRUMMOND	2.0298	2.0903
FRONTENAC	0.8361	0.7197
GASPE EST	0.8735	0.8037
GASPE OUEST	0.2352	0.1778
GATINEAU	48.4184	48.6157
HULL	49.3410	53.7369
HUNTINGDON	1.5424	1.5199
IBERVILLE	2.0883	2.1339
JOLIETTE	2.5650	2.6368
KAMOURASKA	1.1719	0.7269

LABELLE	48.2610	47.9034
LAC ST JEANE	0.3147	0.3084
LAC ST JEANO	0.5369	0.1390
LAPRAIRIE	12.0389	25.2201
L ASSOMPTION	3.9576	4.4747
LEVIS	3.6813	3.9140
L ISLET	0.6901	0.6377
LOTBINIERE	0.6236	0.5467
MASKINONGE	1.0969	1.0611
MATANE	0.6352	0.5143
MATAPEDIA	0.2403	0.1712
MEGANTIC	3.2728	3.0746
MISSISQUOI	2.5660	2.6638
MONTCALM	1.0581	1.0265
MONTMAGNY	0.7410	0.7185
MONTMORENCY	3.4894	3.3465
MONTREAL	283.2063	308.0994
NAPIERVILLE	1.2421	1.2304
NICOLET	1.0263	0.9622
PAPINEAU	7.4441	6.7719
PONTIAC	6.5371	6.1900
PORTNEUF	1.2592	1.2197
QUEBEC	35.4902	38.4194
RICHELIEU	4.3556	4.7024
RICHMOND	1.2974	1.1925
RIMOUSKI	3.0995	2.9304
RIVIERE DU L	4.4625	4.5204
ROUVILLE	3.1991	1.2422
SAGUENAY	41.6956	47.9199
ST HYACINTHE	3.2741	9.0572
SAINT- JEAN	4.8823	5.0189
ST MAURICE	19.1662	18.6189
SHEFFORD	2.5494	2.6420

SHERBROOKE	17.2310	18.5591
SOULANGE	0.9862	0.9961
STANSTEAD	0.8614	0.8430
TEMISCAMING	26.5462	24.9022
TEMISCOUATA	0.6845	0.4848
TERREBONNE	61.2200	67.2976
VAUDREUIL	4.2616	4.6732
VERCHERES	3.1717	3.4687
WOLFE	0.5200	0.4224
YAMASKA	0.5737	0.5116

MONT ORFORD

COMTE	1975	1980
ABITIBI	72.2301	68.9092
ARGENTEUIL	9.6202	8.4767
ARTHABASKA	62.8347	66.2952
BAGOT	16.0944	16.6690
BEAUCE	53.8886	52.2978
BEAUHARNOIS	40.3625	39.8316
BELLECHASSE	3.2404	2.4148
BERTHIER	7.0133	6.3014
BONAVENTURE	3.2603	3.0750
BROME	41.0417	39.5352
CHAMBLY	709.3501	872.0771
CHAMPLAIN	78.4901	71.8197
CHARLEVOIX E	2.0942	1.9599
CHARLEVOIS O	1.5758	1.3736
CHATEAUGUAY	62.1625	78.7937
CHICOUTIMI	53.5873	51.5152
COMPTON	21.1970	15.7563
DEUX-MONT	20.6602	23.7673
DORCHESTER	13.3060	11.3667
DRUMMOND	82.5359	86.3324
FRONTENAC	13.4861	10.7235
GASPE EST	4.1671	3.6683
GASPE OUEST	0.6407	0.4178
GATINEAU	21.8487	21.9850
HULL	72.0978	82.1504
HUNTINGDON	6.1248	5.9883
IBERVILLE	22.7204	23.4835
JOLIETTE	23.9312	24.9640
KAMOURASKA	9.6041	4.6257

LABELLE	5.6329	5.5692
LAC ST JEANE	4.7944	4.6499
LAC ST JEANO	7.3308	0.9285
LAPRAIRIE	79.2457	245.5651
L ASSOMPTION	14.4194	17.3987
LEVIS	13.9751	15.3489
L ISLET	4.6239	4.0981
LOTBINIERE	5.8265	4.7643
MASKINONGE	5.0949	4.8427
MATANE	2.4088	1.7442
MATAPEDIA	1.0831	0.6449
MEGANTIC	56.0718	50.9622
MISSISQUOI	55.9840	59.2790
MONTCALM	5.7275	5.4680
MONTMAGNY	5.6885	5.4264
MONTMORENCY	3.6989	3.4698
MONTREAL	4996.1055	5683.1602
NAPIERVILLE	4.6923	4.6249
NICOLET	12.6085	11.4240
PAPINEAU	9.3137	8.0586
PONTIAC	4.3760	4.0256
PORTNEUF	15.6231	14.8804
QUEBEC	575.7656	650.0137
RICHELIEU	47.8780	53.8290
RICHMOND	90.7090	79.7381
RIMOUSKI	9.8052	8.9990
RIVIERE DU L	12.9004	13.1574
ROUVILLE	48.2267	11.3492
SAGUENAY	137.1591	169.6845
ST HYACINTHE	56.5552	268.1169
SAINT- JEAN	72.6214	75.7516
ST MAURICE	185.2599	177.2305
SHEFFORD	262.2612	276.9766

SHERBROOKE	1939.9924	2173.2976
SOULANGE	3.1062	3.1539
STANSTEAD	90.1338	87.1969
TEMISCAMING	17.2560	15.6486
TEMISCOUATA	5.1851	3.0591
TERREBONNE	192.8994	222.9463
VAUDREUIL	24.8829	28.6511
VERCHERES	37.5405	43.0475
WOLFE	7.2321	5.2615
YAMASKA	5.2592	4.4149

APPENDIX C

QUESTIONNAIRE USED IN THE STE-FOY STUDY

MINISTÈRE DU TOURISME, DE LA CHASSE ET DE LA PÊCHE

LES BESOINS DES QUÉBÉCOIS SONT-ILS SATISFAITS EN MATIÈRE DE CAMPING?

(LES NON-CAMPEURS DOIVENT AUSSI RÉPONDRE À CE QUESTIONNAIRE)

FAÇON DE RÉPONDRE AU QUESTIONNAIRE:

- Ne jamais donner plus d'une réponse par question.
- Ne jamais écrire dans la case contenant le chiffre.

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1) Si vous avez fait du camping durant l'été de 1971, indiquez-en le nombre de nuits. |__|__| 1

SI VOUS N'AVEZ PAS FAIT DE CAMPING, ALLEZ À LA QUESTION 4.

2) Si vous avez utilisé un terrain de camping administré par le gouvernement du Québec, durant l'été de 1971, indiquez-en le nombre de nuits. |__|__| 3

SI VOUS N'AVEZ PAS UTILISÉ DE TERRAIN DE CAMPING DU GOUVERNEMENT, ALLEZ À LA QUESTION 4.

3) Si vous avez utilisé l'un des terrains de camping suivants, indiquez le nombre de nuits passées dans chacun d'eux.

a) Camping provincial de Stoneham à Stoneham. |__|__| 5

b) Camping provincial Ile d'Orléans à St-Jean, Ile d'Orléans. |__|__| 7

c) Camping provincial La Mare du Sault dans le parc des Laurentides. |__|__| 9

d) Camping provincial Vincennes à Beaumont. |__|__| 11

e) Camping provincial Montmagny à Montmagny. |__|__| 13

f) Camping provincial Villeneuve à Villeneuve. |__|__| 15

RÉPONDRE PAR UN «x» AUX QUESTIONS SUIVANTES.

4) Dans quelle catégorie se situe l'âge du chef de famille? (17)

19 ans ou moins	1
20 ans à 29 ans	2
30 ans à 39 ans	3
40 ans à 49 ans	4
50 ans à 59 ans	5
60 ans à 64 ans	6
65 ans et plus	7

5) Dans quelle catégorie se situe le niveau d'instruction du chef de famille? (18)

Études primaires	1
Études secondaires partielles	2
Études secondaires complétées	3
Études collégiales	4
Études techniques	5
Études universitaires partielles	6
Études universitaires complétées	7
Études post-graduées	8
Autre	9

6) Dans quelle catégorie se situe le revenu annuel de la famille? (19)

Moins de $2,999	1
De 3,000 à 5,999	2
De 6,000 à 7,999	3
De 8,000 à 9,999	4
De 10,000 à 14,999	5
15,000 et plus	6

7) Dans quelle catégorie se situe l'occupation du chef de famille? (20)

Employé dans le traitement de la matière première (minerai, produit chimique, textile, etc.)	0
Employé dans une usine de produits finis (mécanicien, etc.)	1
Employé au service du public (policier, barman, etc.)	2
Travail de bureau (secrétaire, agent de bureau, etc.)	3
Professionnel (médecin, avocat, professeur, etc.)	4
Arts (peintre, musicien, écrivain, etc.)	5
Employé dans la construction	6
Opérateur de machine (grue, camion, typographe, etc.)	7
Étudiant	8
Autre	9

8) Indiquez le nombre d'enfants à charge. (21)

Aucun enfant	1
Un enfant	2
Deux enfants	3
Trois enfants	4
Quatre enfants	5
Cinq enfants	6
Six enfants	7
Sept enfants	8
Huit enfants et plus	9

(VOIR AU VERSO)

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APPENDIX D

LIST OF PROVINCIAL CAMPGROUNDS

1. Lac La Vieille
2. Mont Orford
3. La Mare du Sault
4. Lac Dozois
5. Les Pins Rouges
6. Lac Lajoie
7. La Sablonnière
8. Lac Monroe
9. Paul Sauvé
10. Voltigeur
11. Lac Normand
12. Lac Bellevue
13. Stoneham
14. La Loutre
15. Belle Rivière
16. Val-Jalbert
17. Lac du Milieu
18. Lac D'Argenson
19. Rivière Chalifour
20. Lac Albanel
21. Lac Arthabaska
22. Lac Rimouski
23. Rivière Matane
24. La Barrière Johan
25. Etang de la Truite
26. Port Daniel
27. Moisie