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Joseph D. Fridgen
Major professor

Joseph Fridgen

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THE STABILITY OF THE DIMENSIONS UNDERLYING IMAGES OF TOURISM DESTINATIONS IN MICHIGAN

By

David B. Klenosky

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ABSTRACT

THE STABILITY OF THE DIMENSIONS UNDERLYING IMAGES OF TOURISM DESTINATIONS IN MICHIGAN

By

David B. Klenosky

Factor comparison techniques offer a means to investigate the stability of the dimensions underlying visitor images of tourism destinations. This area is useful not only for the development of measurement instruments, but for direct marketing applications as well.

The purpose of the present study was to test for factor stability: (1) across samples for the same region and (2) across regions for the same sample. Data from the 1982 Frankfort-Tawas Study was tested for factor stability using both visual techniques -- number of factors with eigenvalues greater than one, percent of total variance explained, configuration of factor loadings, factor complexity, and the communalities of the variables -- and vector techniques -- Pearson's correlation coefficient, root mean square (RMS), coefficient of congruence (CC), and the salient variable similarity index.

Three stable underlying dimensions were identified: Environmental Excitement, Undeveloped Tranquility, and Service Orientation. All had been identified in previous investigations involving destination images.

In memory of my beloved grandmother,
Rae S. Klenosky.

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CHAPTER I

INTRODUCTION AND PROBLEM STATEMENT

Introduction

The importance of tourism to Michigan may be measured by the extent of the state's investment in tourism promotion. The Michigan Travel Bureau's "Yes Michigan!" promotional campaign (formerly "Say Yes to Michigan") is one indicator of that investment. At present, the state's investment in tourism promotion alone totals approximately nine million dollars (Morris, 1984).

The "Yes Michigan!" campaign has been designed to attract tourists to vacation in Michigan. Attracting tourists to the state offers a means for: (1) stimulating employment, (2) increasing tax revenues, (3) diversifying the state's economy by attracting new industry, and (4) improving public perceptions, both within the state and nationally, of Michigan as a good place to live, visit, and do business (Morris, 1983). The last item, improving the image and perceptions of the state, is central to the campaign to encourage travel in Michigan. Monitoring travelers' images and perceptions of the state is necessary to determine if the "Yes Michigan!" campaign has been effective in achieving that goal.

The images held by potential visitors about an area may have a significant influence upon the viability of that area as a tourism destination (Hunt, 1975). It is hypothesized that regardless of whether an individual has ever visited a particular region, various forces have had an impact on how that individual perceives the region. Paid advertising, news stories, special interest stories, conversations with friends and relatives, as well as one's past experiences all combine to shape one's image of a given area. The image that forms is likely to be as significant as more tangible regional amenities when vacation decisions are made. Information concerning destination images can be used to: improve a negative image, build upon a positive image, or correct a distorted one.

Although several studies have explored regional images, the criteria considered relevant for the examination of a destination's image do not appear to be concrete entities. Different studies have utilized a variety of dimensions to operationalize the construct image. Hunt (1975) considered respondent impressions of a destination's: residents, climate, and attractions. In two other studies (Gearing, Swart and Var, 1974; Var, Beck and Loftus, 1977) five criteria were utilized: natural factors, social factors, historical factors, recreational and shopping facilities, and, lastly, infrastructure and food and shelter. Pearce (1982a) used a set of constructs descriptive of a destination's: scenic beauty, tourist offerings,

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social and political climate, seasonal sport offerings, and suitability for different vacationer "styles" (e.g. seclusion versus high-contact, relaxation versus adventure, etc.). While the dimensions used to study image appear to be quite diverse, there seems to be a degree of commonality among them as well. A better understanding is needed of the components underlying a destination's image to determine if these components are stable across different regions and across different groups of people.

An objective investigation of the components underlying the images of tourism destinations is important both for methodological and marketing purposes. From a methodological viewpoint, the criteria used to assess the image of an area must first be determined in order to develop operational image measurement instruments. The need to develop reliable and valid measurement instruments in tourism studies has received attention from Pearce (1982b), and, in Michigan, from industry representatives in the state (Fridgen, 1982). As Goodrich (1978) suggests, such an instrument can be used to monitor changes, if any, in perceptions of tourism destinations over time through longitudinal studies, or, as mentioned above, to compare the perceptions of selected tourist areas held by various groups of tourists (e.g. visitors versus potential visitors), or to compare perceptions of different regions (e.g. the Lake Michigan coast versus the Lake Huron coast) by the same group.

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From a strategic marketing perspective, the dimensions underlying regional images may be used in at least two ways. The first is in product positioning. As stated by Kotler (1984), product positioning is the act of designing the organization's product and marketing mix to fit a given place in the consumer's mind. Thus, the identified dimensions of image can be used by the Michigan Travel Bureau to position Michigan against the offerings of competing Great Lakes states, or, on another level, position destinations within the state to appeal to a variety of tourist segments.

The second marketing-related application is in the formulation of advertising messages and strategies. Identifying the underlying criteria used to assess a destination's image would be an obvious benefit to efforts aimed at developing promotional strategies for those destinations. The relative importance of those criteria can be examined, and the more salient ones can then be stressed in advertising messages aimed at the proper market segment. In short, for both methodological and marketing reasons, the study of the dimensions underlying regional images is an important research area. Although the study of regional images is important, it is at the same time complex. Therefore, it is necessary to limit the scope of the proposed research.

The regional diversity within Michigan complicates the study of destination images. The proposed study will be exploring basic regional images, but will be developing and comparing dimensions based on coastal regions only. The question that will not be addressed is whether the image structure of non-coastal regions is different than the image structure of coastal regions. While such an examination would be beneficial, it is not among the objectives of this research. The proposed study, then, will focus on images of coastal regions only.

Two regions in Michigan's coastal zone will provide the data for this analysis -- the northeast (Lake Huron) and northwest (Lake Michigan) coasts of Michigan's lower peninsula. Interest in these areas developed during a study conducted by Michigan State University during the summer of 1982 (Fridgen, Udd and Deale, 1983). People indicated a real preference for the northwest coast and virtually ignored the northeast coast when completing a cognitive mapping task asking them to circle areas they felt best provided for recreation and tourism opportunities in the state. The 1982 Frankfort-Tawas Study, was subsequently undertaken to investigate whether there were differences in the perceptions and images of the two coasts. Respondents at each location (Frankfort and Tawas) were each asked to rate two different regions of Michigan's Lower Peninsula (the northern Lake Michigan coast and the northern Lake Huron coast) using an adjective checklist format. The use of this format offers the potential to explore the dimensions underlying regional images with the use of factor analytic techniques. Further, the research design employed in the study allows the examination of regional images across groups of respondents and across target regions.

In summary, the focus of this research is on examining the nature and stability of the dimensions underlying regional images of specific coastal destinations in the state of Michigan. A twofold approach will be used to achieve this goal. In the first step, the Frankfort-Tawas Study, discussed above, will be factor analyzed to identify the dimensions which underlie visitor images of the two coastal areas in question. The second step will test the stability of those dimensions across different groups of respondents (those in Frankfort and those in Tawas) for the same region (e.g. the Lake Michigan coast), and across different regions (the Lake Michigan coast and the Lake Huron coast) for the same group (e.g. the Frankfort sample).

Study Objectives

The general objective of this study is to explore the stability of the dimensions underlying regional images. Relative to this general objective, the specific study objectives are:

1. Identify the underlying dimensions of the image of two coastal regions in Michigan.
2. Test the stability of those dimensions across different respondents and different regions.

Organization of the Study

The remainder of this study is organized into five chapters. A review of the relevant literature is the subject of the next chapter. The literature review includes sections on: the uses of factor analysis (in general and in regional image studies), the techniques used to compare factor structure, and applications of those techniques to studies in tourism and recreation. The chapter concludes by presenting the research questions used to guide the data analysis portion of the study. Chapter III presents the research methodology. This includes a summary of the original data collection effort on which the present study is based, the study variables, the procedures used to analyze the data, and the criteria which will be used to evaluate the results of the factor comparisons. Chapter IV offers the results of the factor comparisons. This chapter consists of two major sections: comparison across samples and comparison across regions. The fifth and final chapter contains a discussion of the results, conclusions, study limitations, and recommendations for future research in this area.

CHAPTER II

LITERATURE REVIEW

Two objectives for this research are outlined in the previous section. The first objective is to identify the underlying dimensions of the image of two coastal regions in Michigan. Factor analysis will be used for this phase of the analysis. The second objective tests the dimensions identified in the previous objective for stability across different groups of respondents and across different regions. This phase will employ factor comparison techniques.

To more fully understand the methods applied in this research, this section will provide discussions of: (1) the uses of factor analysis; (2) studies that have utilized factor analysis to investigate regional images; (3) the techniques used to test for the stability of factor structure; and (4) tourism and leisure research studies employing factor comparison techniques.

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The Uses of Factor Analysis

An implicit assumption of factor analysis discussed by Stewart (1981) is of special interest to this study. He notes that a chief assumption of factor analysis is that "major differences found in everyday human relationships become part of the language of the culture. At one level factor analysis is concerned with how people use the language, its words, concepts, etc. and the empirical relationships within the language. The underlying assumption is that these empirical relationships within the language will reveal something about human behavior on another level" (p. 51). Thus, the theoretical basis of factor analysis is that people use language in similar ways. The techniques of factor analysis are used to operationalize this theoretical concept.

"The term factor analysis refers to a broad category of approaches to conceptualizing groupings (or clusters) of variables and an even broader collection of mathematical procedures for determining which variables belong to which groups" (Nunnally, 1978, p. 327). As stated by Harmon (1976), the chief aim of factor analysis is "to attain scientific parsimony or economy of description" (p. 4). Thus, factor analysis is most often thought of as a data reduction technique.

As a data reduction technique, applications of factor analysis can be classified into one of the following categories: (1) exploratory uses -- the exploration of and detection of patternings of variables with a view to the discovery of new concepts and a possible reduction of data; (2) confirmatory uses -- the testing of hypotheses about the structuring of variables in terms of the expected number of significant factors and factor loadings; and (3) uses as a measuring device -- the construction of indices to be used as new variables in later analysis (Nie, Hull, Jenkins, Steinbrenner, and Bent, 1975). In the present study, factor analysis will be used mainly for exploratory purposes -- to identify the underlying dimensions of the images of two coastal regions in Michigan and to determine the extent of the stability of regional images across groups of respondents and across regions.

It is important to recognize that factor analysis does not indicate quantitative differences between variables, although these may indeed be important. Rather, it is used to explore the dimensional structure for data; it indicates the important qualities present in the data. In short, factor analysis provides a means for reducing the number of variables in a study without great loss of information and serves to identify the important qualitative distinctions in the data (Stewart, 1981).

Image Studies Employing Factor Analysis

Studies which employ factor analysis to assess regional images are, for the most part, sparse in the literature. It appears that the technique has been utilized either only as a first step in an analysis or used to examine only a single component of a region's image. Nevertheless, it is instructive to present these applications of factor analysis.

Crompton (1979) utilized factor analysis to develop a set of 30 semantic differential statements to investigate Mexico's image as a tourism destination. Crompton's goal was "to develop a comprehensive set of terms which, when taken together, would constitute a valid content universe of the image of Mexico" (p. 19).

The set of terms was derived in a two step procedure. The first step entailed a content analysis of selected general reading materials on Mexico and of advertising brochures published by the Mexican National Tourist Council. Eight content areas of area image emerged and key words or phrases descriptive of image attributes were collated. Crompton then expanded this set of words and phrases using a series of 36 unstructured interviews which were similarly content analyzed.

In the second phase of his procedure, Crompton organized the basic descriptive terms into 42 semantic differential statements which were administered to a convenience sample of students (n = 70). After factor analyzing this data, Crompton reduced the 42 statements to a set of 30 by retaining those which displayed a salient loading on the factors. The statements were subsequently administered to a sample of students across the U.S. (n = 617) to determine the relative importance of each image attribute and to explore the relationship between respondents' geographic location upon those attributes.

This study could be criticized because neither the eight content areas of image nor the procedures employed in the factor analysis were noted explicitly. Further, it was not stated whether the eight content areas of image identified in the first step were validated in the factor analysis used in the second; one might expect this to be the case. Finally, the number of cases used to reduce the number of semantic differential statements in step two (N = 70), was too small given the number of statements/variables (42) which were factor analyzed. The "rule of thumb" for factor analysis is five cases for each variable (Kass and Tinsley, 1979, p. 124).

Craik (1975) employed an adjective checklist format to understand and account for the individual differences in landscape descriptions rendered by participants who took an auto tour through an "everyday physical environment located in Marin County, California" (p. 131). The sample used in this study was considered reasonably representative of the general population of Marin County (n = 187).

The research project entailed a multi-step procedure. Individuals were first given the auto tour through the target site. Following the tour, they were asked to describe the place they toured using a 240 item environmental adjective checklist. In addition, they were asked to describe themselves on a number of standard personality and attitude measures.

The analysis of the data for this study can be broken down into two phases. The first centered on the adjective checklist (ACL). Of the 204 items on the ACL, only those items receiving endorsement rates greater than 10 percent were retained, yielding a subset of 104 items. These adjectives were then submitted to a principal axis factor analysis, employing the "highest r" method of estimating communality (this method places on the diagonal for a given row of the correlation matrix the largest correlation coefficient in that row). Varimax rotation of a four factor solution accounting for 65.2 percent of the variation in the data resulted in four factors. The four factors were labeled (1) serene-gentle; (2) dry-barren; (3) beautiful-picturesque; and (4) blooming-cultivated. Factor scores were then computed, and used in the next phase.

Phase two used the factor scores for the four descriptive landscape dimensions identified in phase one as the inputs for a typological analysis. This analysis used a hierarchical clustering algorithm (BCTRY OTYPE) to develop clusters of individuals. Craik was able to identify 16 types based on the landscape descriptions. As a final step, he proceeded to report, in textual format, the characteris-

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tics (as reported on the personality and attitude measures) of the respondents comprising each group.

This study offers a great deal of guidance both methodological and theoretical. Methodologically, Craik employed factor analyses on an adjective checklist to develop summary descriptions of landscapes. This method parallels the proposed research. In addition, the retention of adjectives with endorsement rates greater than 10 percent has received support from other empirical studies factor analyzing dichotomous variables (Chase and Cheek, 1979). Although dichotomous variables are not strictly consistent with the assumptions of factor analysis, using dichotomies with splits less than 10 percent indicates an extremely skewed distribution. Such a distribution is obviously very far from a normal one, which factor analysis assumes is the case.

Theoretically, Craik was able to show that different groups of respondents can be grouped into typologies based on differences in how they perceive the same environment. In this case, the researchers assumed that factor structure was stable across respondents. The question the proposed research raises and seeks to investigate is whether this assumption is a valid one. This issue is one of the chief goals of the proposed analysis.

Ritchie and Zins (1978) explored the importance of culture as it relates to the attractiveness of Quebec as a tourism region. The respondents in the study were managers and functionaries from various sectors of the tourism system in Quebec. The study relied on a set of eight "general" factors, which were originally developed through an expert judgment approach by Gearing, Swart, and Var (1974) to determine the overall attractiveness of tourism regions. The eight factors were: (1) natural beauty and climate; (2) culture and social characteristics; (3) sport, recreation, and educational facilities; (4) shopping and commercial facilities; (5) infrastructure of the region; (6) price levels; (7) attitudes towards tourists; and (8) accessibility of the region.

A factor analysis was performed, using interval scale measurements, on the set of eight "general" dimensions yielding eight independent factors. Though some correlation was reported between the dimensions accessibility and infrastructure as well as between the dimensions price levels and commercial facilities, the researchers concluded that all eight dimensions should be used separately in evaluating the overall attractiveness of a tourism region.

Within the cultural and social dimension, twelve elements were hypothesized to contribute to the attractiveness of a tourism region -- (1) handicrafts; (2) language; (3) traditions; (4) gastronomy; (5) art/music; (6) history; (7) work; (8) architecture; (9) religion; (10) education; (11) dress; and (12) leisure activities. Respondents were asked to rate the above elements as "perceived" from the standpoint of both residents and non-residents.

Separate factor analyses were run on the 12 variables for ratings received from both the resident and non-resident perspective. Only the factors derived from the resident perspective were interpreted and presented. This analysis yielded four dimensions which explained 64% of the variation in the set of cultural variables. These were labeled: (1) elements of daily life; (2) remnants of the past; (3) the good life; and (4) work. Unfortunately, neither the type of factor analysis employed nor the method of rotation (if any) were mentioned. This information would have been useful in the present study.

Pizam, Neumann, and Reichel (1978) sought to empirically identify the dimensions underlying tourist satisfaction with a tourism area and suggest methods to measure them. This study was chiefly concerned with feelings of gratification or displeasure about a destination following interaction with that destination. Although regional image studies, including the proposed research, normally explore the additional aspect of how regions are perceived by individuals regardless of whether they actually visited them, this research is very instructive. The sample in this study consisted of summer tourists to Cape Cod, Massachusetts (n = 685).

The first step in the analysis was to develop a means to measure the construct of tourist satisfaction (conceptually defined as a collection of tourists' attitudes about specific domains in the vacationing experience).

Seven major domains were identified (based on a review of the literature, consultation with experts familiar with Cape Cod and the study of tourism, and a series of open-ended interviews with tourists): (1) accommodations; (2) eating and drinking establishments; (3) accessibility; (4) attractions; (5) cost; (6) amenities and facilities; and (7) hospitality. Thirty-two 5-point Likert scales were developed to operationalize the range of satisfactions embodied in those domains.

Of the 32 Likert scales items, those receiving the highest ratings were natural assets -- scenery, natural attractions, the environmental quality, and beaches -- and tourism facilities including hotels, motels, and restaurants. The items receiving the lowest ratings included high costs, traffic conditions, and extent of commercialization.

Factor analysis was used to identify the dimensions of tourist satisfaction with destination areas. The authors write:

> "Factor analysis is especially useful in measuring tourist satisfaction since the tourism product is made up of many interrelated components each of which requires a separate measure of satisfaction. By using the factor analytic technique we can simplify the multiplicity of these measures" (p. 317).

In this study principal factoring without iteration (principal components analysis) was performed on the 32 items. Factors with eigenvalues (before rotation) greater than or equal to one were retained, and varimax rotation was specified.

The procedure above yielded 8 factors. Twenty-four of the original 32 items had loadings of .60 or greater with one of the eight factors. The 8 factors were labeled (1) beach opportunities; (2) cost; (3) hospitality; (4) eating and drinking facilities; (5) accommodation facilities; (6) campground facilities; (7) environment; and (8) extent of commercialization. Evidently, there is a good deal of overlap between the identified factors and the hypothesized satisfaction domains.

The authors note that their findings by no means suggest that the above factors are universal. They propose that the factors probably depend on a number of elements including the destination area, its facilities, attractions, land formations, weather, and so forth. They conclude, however, that destinations having features similar to those of Cape Cod, Massachusetts -- rural summer beach resort areas -- could use the same factors as the ones developed in this study. Given, the importance of the Great Lakes coastal zone and the similar seasonality of tourism in Michigan, theirs' is a notable conclusion.

All the studies discussed above have employed factor analysis either as an initial step for further analysis or to summarize regional images into a set of underlying dimensions. None of these studies have sought to compare factor structure across groups of respondents or across regions. Alternately, studies which have employed factor comparison techniques have not been concerned with regional images (to date). The techniques employed in factor comparison studies is the subject of the next major section.

Factor Comparison Techniques

The comparison of the results of separate factor analyses entails an examination of the consistency of those results. Such comparisons have inherent linkages to the development of a science as a body of knowledge. As Rummel (1970) notes:

> "To build a science requires that findings be sufficiently explicit to make possible evaluation, replication, and comparison with other studies. Each study in its own right may contribute a bit of knowledge -- a datum -- to building a science. But these data output of different studies must be integrated into general propositions and given meaning in terms of a theoretical framework. This requires that comparison between findings be possible so that the replicable substantive patterns can be identified, and the unique, research-design-specific results can be discarded" (Rummel, 1970, p. 449).

The factors that result from a particular analysis cannot be considered definitive until some form of analysis is performed to assess their generalizability. "A factor once found remains merely a hypothesis about a pattern; it is verified only after the pattern has been found again in well-defined circumstances" (Cattel and Baggaley, 1960, p. 33). Factor comparison techniques provide a means for determining the stability of factors across samples, va

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variables, and experiments. The purpose of this section is to discuss the techniques of factor comparison suggested by the literature.

In all methods of factor matching the variety of preliminary decisions made in the course of the analysis should be the same across the two or more studies being compared (Rummel, 1970). This entails consistency in: the scaling procedures used on the original data, associational statistics (correlation measures), and factor extraction procedures. The idea is to ensure that the degree of dissimilarity between the studies can be attributed to differences in interdependencies, not differences in methods. "As a general rule, comparability of procedures removes one obvious plausible rival source of variance" (Levine, 1977, p. 43).

Considerations

Before an appropriate approach can be determined a number of elements must first be considered in contemplating or making a comparison. These include: the objects of comparison, the substance of comparison, and the research design underlying the comparison.

Object of Comparison. Five possible matrices may be produced from a factor analysis (Rummel, 1970): (1) correlation inverse matrix, (2) factor loading matrices, (3) higher-order matrices, (4) factor regression matrices, and (5) factor score matrices. Although each one may be suitable for a particular purpose, only two will be considered here: factor loading matrices and factor score matrices.

Factor loading matrices give the loadings of the variables on factors. There are two major types of matrices, the initial or unrotated factor matrix and the simple structure or rotated factor matrix. The unrotated matrix defines the patterns of variance in the data; the rotated matrix identifies the clusters of intercorrelation among the variables. Among the rotated matrices, comparison may be of either orthogonal or oblique factor matrices. Further, for the oblique case one must consider the choice between pattern and structure matrices.

If the cases as well as variables are of interest, factor scores also may be compared between studies. Use of this technique is suggested when the subjects are the same since "similarity of factor loadings across two structures does not imply similarities of factor scores across the two structures necessarily" (Rummel, 1970, p. 457).

Substance of Comparison. Comparison may involve several aspects of the factor results. While one aspect, such as the loadings, may predominate in the comparison, a full assessment of the similarity of two studies should involve other considerations as well (Rummel, 1970). This entails comparisons of: factor configurations, complexity, variance, number of factors, and communalities.

The configuration of variables refers to the pattern and magnitude of the factor loadings. Rummel (1970) points out that configuration comparisons are the most common form of factor comparison.

Complexity is another aspect that may be expressly compared. Rummel (1970) provides some guidance for this area of comparison:

> "Although implicitly involved in the comparison of configurations, the relative complexity of variables and factors may be explicitly noted. Does a variable highly loaded in one study spread across factors in another? Does a specific factor in one study shift to a common factor in another? Shifts in complexity are clues to the underlying differences in the data. They provoke "why" questions, answers to which may explain some of the differences between the studies" (p. 453).

One may also wish to compare the variance accounted for by each and all of the factors. When the factors are consistently found to explain considerable variance across studies, this suggests that the factors represent some underlying dimension rather than being an artifact of a particular study (Allen and Buchanan, 1982).

In addition, the number of significant factors extracted from different studies may be compared to provide an indication of the degree of convergence on the underlying dimensions. Moreover, such comparisons can be helpful in assessing the best number of factors to rotate in future analyses.

Finally, an analysis of the communality of a variable between studies may be conducted. This approach allows one to determine which variables are highly inter-correlated and which are consistently unique. The latter may result from poor measurement characteristics, poor data, or causal influences not under the control of the investigation. The identification of these consistently unique variables encourages such questions and may provoke research to answer them (Rummel, 1970).

Research Design of the Comparison. The type of comparison contemplated is largely dependent upon the nature of the research design. The possible situations of comparison are: (1) the variables and cases of both studies are the same; (2) the variables are the same, but the cases differ; (3) cases are the same, but the variables differ; and (4) neither variables nor cases are the same (Rummel, 1970).

In the first instance above, factor loadings and/or factor scores may be used as the object of comparison. These will determine the extent the relationships between variables are the same between studies. For the second situation, in which several variables are similar but cases differ, comparison is restricted to the factor loading matrices. When several cases are the same, but the variables differ, as in the third situation, only factor scores may be compared (this relates back to the previously mentioned point that similarity of factor loadings does not necessarily imply similarity of factor scores across two structures). Finally, with different subjects and different variables "the problem belongs to Alice in Wonderland" (Cattel, Balcar, Horn, and Nesselroade, 1969, p. 782). That is, unless some linkages are established apart from the factor analysis, this type of factor comparison is inappropriate. Table 1 presents a summary of the appropriate objects of comparison for the possible research designs of the comparison.

Table 1
Appropriate Objects of Comparison for the Possible Research Designs of Comparison

	CASES	
VARIABLES	Same	Different
Same	- Factor Loadings - Factor Scores	- Factor Loadings
Different	- Factor Scores	

Approaches

The approaches used to compare factor structure can be classified into three groupings: (1) visual comparisons; (2) vector comparisons; and (3) matrix comparisons. These approaches increase in complexity moving from the first to the third.

Visual Comparisons. This approach to factor comparison entails the visual matching and assessment of the results from various studies. It involves comparing the configuration, communalities, and complexities of the variables and factors to get an overall impression of their agreement. This observational analysis allows one to look for subtle differences between factors, which can then be augmented by more mathematical techniques of comparison (Rummel, 1970).

Another type of visual approach suggested by Levine (1977) is to pool the two matrices adding a dummy variable indicating group membership (that is, perform one factor analysis on the combined sample using an additional varaible which identifies the subsample each respondent is from).

> "The loading of this identification variable would indicate those factors, assumed to exist in both groups, on which the groups are most discriminated, therefore, the factors for which the group's mean factor scores would be most different. This technique does not give separate factor structures for the two (or possibly more) groups but one should always assume that the cases from two or more groups are homogeneous until this assumption breaks down empirically (p. 43).

This technique is not applicable to situations where one does not access to the original data -- for example, if one is comparing one's own data to another previously published study, the data from which is not available.

Vector Comparison. The mathematical approaches available for comparison can be divided into those that compare several pairs of factors and those that compare the whole factor matrix. This latter approach will be discussed in the following section. The vector comparison approach takes the factors in the different studies as they are. No attempt is made to compensate for their peculiar errors, specific variances, and effects of dissimilar variables

(Levine, 1977). Thus, factors are compared in pairs and their similarity measured by one of the techniques discussed.

The most commonly employed technique used to compare the loadings (or factor scores) between factors, when the same variables are involved, is the product moment correlation coefficient. This approach, however, does suffer from a number of weaknesses. The risk of finding consistency between individual factors by chance increases greatly with the number of correlations computed. Further, although a correlation coefficient indicates the similarity of patterns across two variables across the two studies it does not address the issue of differences in the comparative strengths of the factor loadings of individual variables across the two factors (Levine, 1977).

Three correlational methods are sensitive to the strength (magnitude) as well as the consistency (pattern) of loadings across two factors. The first is the root mean square measure (RMS) (Harmon, 1967); the formula is given below. This method, which is proportional to the Euclidian distance between two factors, imposes the most stringent comparison since variation in either pattern or magnitude will be detected. RMS reaches a minimum of 0, for a perfect pattern-magnitude match, and a maximum of two, when all loadings are equal to unity but of opposite signs across studies. Intermediate values, however, (for example, one), are extremely difficult to interpret in terms of factor similarities (Levine, 1977).

$$\mathrm{RMS} = \left[\frac{\sum_{i=1}^{k} (f_{1i} - f_{2i})^2}{k} \right]^{1/2}$$

where: f_{1i} = the loading of the ith variable on factor F1
f_{2i} = the loading of the ith variable on factor F2
k = the number of variables in the two studies

Another correlational measure which is less stringent and easier to interpret is the coefficient of congruence (CC) (Wrigely and Neuhaus, 1955). It is more like the product moment correlation coefficient in that it ranges from +1.0 (for perfect positive similarity) to -1.0 (for perfect negative similarity). Its formula is:

$$\mathrm{CC} = \frac{\sum_{i=1}^{k} (f_{1i})(f_{2i})}{\left[\left(\sum_{i=1}^{k} f_{1i}^2 \right) \left(\sum_{i=1}^{k} f_{2i}^2 \right) \right]^{1/2}}$$

that is, the sum of the products of the paired loadings divided by the square root of the product of the two sums of squared loadings. This is not strictly a correlation coefficient since it does not equate means -- the two sets of loadings are not standardized. While geometrically the root mean square is proportional to the distance between factors, the coefficient of congruence is the cosine of the angle between the factors in the space of k orthogonal variables. Although this coefficient is widely used, Levine

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(1977) notes that one tends to get a high CC whenever two factors have many variables with the same algebraic sign.

For both the RMS and CC the sampling distribution is not known, precluding tests of significance between matches. Further, the fact that RMS and CC are sensitive to both pattern and magnitude is not necessarily a desirable trait according to Levine (1977), who argues for indicators that tap single unidimensional domains of content. He contends that pattern similarity is more central to the issue of factor comparability because possible differences in variance might well exist across groups in different settings. Low variance for one group may cause loadings for that group to be lower than another group with higher variance and thus higher loadings. Despite differences in loadings caused by differing variances, pattern similarity may well exist between the two situations under comparison. In short, the issue is whether we are more concerned with finding similarity of level or of shape.

Cattell's salient variable similarity index, or S-index (Cattell et al., 1960; Cattell et al., 1969), is a product of that debate. The S-index employs a nominal scale to classify loadings into salient and hyperplane categories. A hyperplane loading may be operationally defined as a near-zero loading, usually taken to mean a loading in the range of -.1 to +.1. Loadings in excess, in absolute value, of .1, or some other cutoff value, are considered to indicate variables salient to the factor, variables on which the underlying factor is acting. Variables lying in the hyperplane of a factor have a relationship to that factor no greater than expected by chance. The salient loading variables are further categorized as positive or negative salients according to their algebraic sign. Thus, the loadings of a set of variables can be expressed in a 3 by 3 table, with the categories being positive and negative salients and hyperplane. The S-index is then calculated from this crosstabulation by comparing the cell frequencies (see figure below) using the following formula:

$$S = \frac{c_{11} + c_{33} - c_{13} - c_{31}}{c_{11} + c_{33} + c_{13} + c_{31} + .5(c_{12} + c_{21} + c_{23} + c_{32})}$$

	PS	HY	NS
PS	c_{11}	c_{12}	c_{13}
HY	c_{21}	c_{22}	c_{23}
NS	c_{31}	c_{32}	c_{33}

where: PS = positive salient ($f_i > .1$)
HY = hyperplane ($-.1 < f_i < .1$)
NS = negative salient ($f_i < -.1$)
c_{ij} = the number of loadings in cell_{ij}

The index may be seen as a comparison of the difference between the number of hits and misses as a proportion of a weighted sum of the cell frequencies. It reaches a maximum value of +1.0 (when there is a perfect relationship) and a minimum of -1.0 (when there is a perfect inverse relationship); a value of 0 indicates no similarity between the two factors. Thus, the values obtained are easily interpreted (like the product moment correlation coefficient). Of course, the index is throwing out a large amount of information, that is, it equates a loading of .9 with one of .3, but it also reduces the risk of capitalizing on chance differences among the loadings. Probability tables are available which provide critical values for significance testing. These tables are organized according to the number of variables under investigation and by the percentage of loadings between the two factors falling into the hyperplane category. "Since this index makes sense, is so easy to calculate, and has an approximate test of significance, I suggest it strongly as one of (hopefully) several measures used" (Levine, 1977, p. 48).

Finally, there is another approach that has received attention in published empirical studies. This approach, which appears appropriate when comparing 2 sets of factors derived from two samples on the same set of variables, is performing an analysis of variance on the factor scores derived from the separate analyses. While this method appears in the empirical literature, no reference to it appears in the more technical factor comparison literature. The approach, however, does seem to be a valid one.

Matrix Comparison. The final approach to factor comparison determines the extent of the match between two factor matrices. This approach addresses the problems associated with vector comparisons. "The difficulty with the vector comparison approach is that the factors are compared as given. Exogenous influences may affect the independent rotations of the two studies and confound the comparisons" (Rummel, 1970, p. 463). There are two main methods of matrix comparison, canonical analysis and target analysis (also known as transformation analysis). A discussion of these techniques, however, is beyond the scope of this research.

Of the myriad of factor comparison techniques available, one suggestion is consistent throughout the literature: employ several, do not rely on one alone. "By employing a combination of approaches, the limitations of individual techniques are minimized and the potential for misinterpreting factor similarities is substantially reduced" (Allen and Buchanan, 1982, p. 310). Prior to discussing the specific methodology to be employed in the proposed study, it is useful to examine the procedures that have been applied in previous studies using factor comparison techniques.

Studies Employing Factor Comparison Techniques

Studies employing factor comparative techniques emerged primarily from the disciplines of psychology and political science. Similar studies in the leisure and tourism fields do exist and are instructive for this research. This section will present those studies which offer some guidance on the techniques used to compare factor structure.

In recreation and leisure research, the emphasis of these studies has been either on testing the stability of leisure motivations across samples or assessing the congruence between participation and preference/interest for various leisure activities. The discussion of these studies will mainly stress their technical aspects. In tourism only one investigation has been identified which is related to factor comparison. Although it should be noted that this study does not utilize any of the comparison techniques described above, it is pertinent to the discussion of comparative research.

Stringer (1984) described the aspects of six graduate thesis including the work of McCullough (1977), who focused on images of tropical destinations. McCullough used the concept image in an empirical investigation of the similarities and differences in the images of tropical "holiday" destinations held by experienced "long-haul" travelers and the images attributed to those destinations by travel agents. The travelers (n = 56) were asked to imagine a perfect holiday on an unnamed tropical island and to use a Q-sort method on a set of 50 descriptive statements to determine the relative salience to them of each statement. Similarly, travel agents ($n = 21$) were asked to sort the same items according to their assessment of the relative importance of each item to a typical, experienced client.

Two factor analyses were performed, one on the traveler sample alone and one on the entire sample. The first produced 11 image dimensions which were labeled: (1) romantic-practical; (2) service oriented-cultural; (3) peaceful-festive; (4) functional-comfortable; (5) reliable-adventurous; (6) public-private; (7) secure-foreign; (8) social-physical; (9) natural-sophisticated; (10) convenient-exotic; and (11) organized-unspoilt. McCullough inferred that all these dimensions contrasted people's normal, civilized life-style, involving notions of familiarity, efficiency, security, and privacy, with the uninhibited, natural, or uncivilized life-style of a remote holiday -- specifically, romance, festivity, and the exotic.

The second factor analysis performed was a Q-mode analysis (using the observations as variables). It produced two groups, one mainly of travel agents the other of travelers. The differences between the two sets of images were found to be mainly on items located in the factors romantic-practical, and natural-sophisticated. The travel agents overemphasized the importance to tourists of sunshine, sophistication, and romance, and underestimated the importance of unspoilt nature, local culture, and social encounters.

While this study was not consistent with any of the factor comparison techniques presented in the previous section, it does demonstrate two points. First, research in tourism offers many unique opportunities to employ factor comparison techniques in meaningful ways -- McCullough emphasized that travel agents could learn much from the differences in the relative importance attributed to the various images. Second, variations between groups of respondents were found, in terms of how they evaluate tourism environments. As mentioned before, such an investigation is central to the proposed research.

Graefe, Ditton, Roggenbuck, and Schreyer (1981) sought to examine the dimensionality, stability, and the importance of motives for participating in the same recreational activity -- river floating -- in two different environmental settings -- the Green and Yampa Rivers in Dinosaur National Monument on the Colorado- Utah border (n = 854) and on the Rio Grande River in Big Bend National Park in Texas (n = 253).

The researchers used a mailed questionnaire distributed to a sample of river users who had obtained a (mandatory) river use permit. Data was collected on a 38 item, multidimensional motive scale (developed by Driver) using a six-point response format to indicate the relative importance of each motive as a reason for going on the river trip.

In this study, factor analysis was used to address the issue of factor stability across samples. The method of principal factoring with iterations (principal axis), followed by varimax rotation of factors with eigenvalues greater than one, was used to reduce the 38 items to a smaller number of orthogonally unique motive scales. The coefficient of congruence (CC) -- a vector comparison approach -- was used to test the similarity between the 7 factors derived from the Green and Yampa sample and the 8 factors from the Rio Grande sample.

In short, certain motive constructs were found to be more stable across the samples than other motive constructs; these were characterized as learning/experiencing nature and stress release/solitude. Other constructs were not as stable, nor was the stability of the original hypothesized constructs verified. The study can be criticized in that it only used one technique -- the coefficient of congruence -- to assess the similarity of factor structure across samples.

Bishop (1970) factor analyzed the results of a survey concerned with the frequency of participation (on a nine-point scale) in 25 recreation activities in four selected midwest communities -- Minneapolis, Minnesota (n = 925) and in Illinois, River Forest (n = 130), Glencoe (n = 411), and Elk Grove (n = 415).

The data for each community was subjected to a factor analysis (principal axis) using squared multiple correlation coefficients as the communality estimates. A three factor solution (determined by those factors with eigenvalues greater than one) was then rotated according to the varimax criterion. Estimated factor scores were then calculated for all respondents.

The stability of factor structure was assessed using a visual comparison approach. As a final step, Bishop correlated the factor scores for each subject with demographic and socioeconomic variables to lend support to the factor interpretations. Bishop was able to demonstrate that the three factors -- active-diversionary, potency, and status -- were stable across the four communities.

This study did not employ any technical factor comparison techniques to assess stability. An analysis of the data using those techniques would help to verify the results found.

Finally, Allen and Buchanan (1982) illustrated the use of five factor comparison techniques -- the correlation of factor scores, the correlation of factor loadings, the S-index, the root mean square (RMS), and the coefficient of congruence (CC) -- by comparing a leisure factor structure based on participation data with a leisure factor structure based on interest data. The authors measured respondents' interest and participation in 52 specified leisure activities (chosen to represent 17 leisure categories identified through previous factor analytic studies) using five point Likert scales.

Separate factor analyses were performed for both groups of variables (interest and participation) using principal factoring with iterations (principal axis). The initial common factors were rotated to a final solution using varimax rotation. Only factors with eigenvalues greater than one were retained for discussion and further analysis. The resulting nine factors for the interest variables were then compared to the eight factors from the participation data using each of the five techniques above -- all vector comparison approaches.

The results indicated that six of the factors were very similar for the two factor structures. They concluded that by using the five measures above, one achieves a more sensitive analysis of factor structure similarity than can be achieved by standard correlational measures alone. This study was instructive in that it employed almost all of the factor comparison techniques discussed in the previous section.

Summary

This chapter was primarily concerned with acquainting the reader with the techniques used for comparing factor structure and the applications of those techniques to tourism, leisure, and recreation issues. The chapter included sections on the uses of factor analysis, applications of factor analysis to studies of regional images, the techniques used to compare factor structure across studies, and, finally, the applications of those techniques in leisure and recreation.

Research Questions

The present study is exploratory. In recreation, factor comparison research is a relatively new area; in tourism, it is even newer. Therefore, specific hypotheses will not be tested explicitly. Instead, the following research questions were developed to guide the data analysis:

(1) Are any of the dimensions underlying tourists' images of a specific tourism destination stable across different samples of respondents?, and

(2) Are any of the dimensions underlying tourists' images of tourism destinations stable across different destinations (target regions) for the same sample of respondents?

CHAPTER III

RESEARCH METHODOLOGY

Research Design

The literature review suggested a number of techniques to compare factor structure in a variety of research designs. It demonstrated the use of these methods in several leisure and recreation studies, and emphasized that the application of these methods to assess the stability of regional images of tourism destinations has not been previously attempted. To reiterate, this study is directed at one basic question: what is the stability of the dimensions which underlie regional images across different subsamples of respondents and across different target regions.

To address this question, the ideal study would employ a research design that samples (at least two) different subgroups' images of (at least two) different regions using an established measurement scale specifically designed to assess regional images. Mainly due to the time and monetary constraints of collecting primary data, secondary data was used in the present research. Specifically, a pilot study -- the 1982 Frankfort-Tawas Study --

from a larger tourism image project intended to identify and assess traveler-defined tourism regions in Michigan (see Fridgen, Udd, and Klenosky, 1984; and Fridgen and Klenosky, 1985) provided an appropriate data set for the analysis. Although not a perfect substitute, the 1982 Frankfort-Tawas Study does meet the research design requirements and, for the most part, the measurement requirements as well.

The 1982 Frankfort-Tawas Study

This section summarizes the 1982 Frankfort-Tawas Study which provided an appropriate data base for the present study. The Frankfort-Tawas Study was designed to explore the images and perceptions of two distinct coastal regions (the Lake Michigan and Lake Huron coastlines of the northern lower peninsula) held by visitors to two distinct destinations (Frankfort, located on the Lake Michigan coast, and Tawas, located on the Lake Huron coast). This study was a pilot study intended to provide baseline information for use in subsequent studies in a broad tourism image project conducted by the Department of Park and Recreation Resources at Michigan State University. The original objective of the study was to compare images and perceptions of two selected areas in Michigan and to make inferences from any similarities or differences that ocurred.

Study Areas

For the proposed research, which entails a comparison of samples drawn from Frankfort and Tawas, it is important to understand why the two communities were originally selected as study areas[1]. First, each community has a relatively small population (1,967 for Tawas and 1,603 for Frankfort[2]) which indicates that the two areas are of approximately equal size.

The second reason for selecting these two communities as study sites is that they provide and service a large variety of waterbased and non-waterbased recreational opportunities. The Frankfort area is located a few miles south of Sleeping Bear Dunes National Lakeshore which serves as a major recreational resource in Michigan providing opportunities for: duneclimbs and hikes, scenic drives, beaches and swimming, canoeing, fishing, and camping. In addition, two major rivers flow into Lake Michigan in this area -- the Betsie River to the south and the Platte River to the north. Several inland lakes with public access are also located in this area -- Crystal Lake, Platte Lake, and Little Platte Lake -- which provide for additional water-based activities. Finally, the Huron Manistee National Forest provides major tracts of forested lands for public recreational use.

The Tawas area possesses a similar set of natural attractions. Lake Huron provides for all forms of boating and other waterbased activities. Tawas Point State Park is

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[1]The majority of this discussion is taken from Eckstein (1983).

[2]Michigan 1980 Census of Population.

located at the tip of Tawas Bay and provides beaches, swimming, hiking, and camping facilities. Also located in the Tawas area are: three campgrounds (with over 400 sites); two public fishing docks; charter fishing boats; boat launching sites; and riding, hiking, snowmobile, and cross-country ski trails. Inland waterareas in the Tawas area include Tawas Lake, the Tawas River, and the AuSable River. Finally, the Huron National Forest, located along the AuSable, provides for a variety of recreational opportunities.

Both shoreline areas possess an abundance of natural resources providing recreation opportunities on a Great Lake or in surrounding inland areas. In addition, the two communities are of a comparable and manageable size. And finally, the two areas were used as study sites in a previous tourism study with favorable results (see Eckstein, 1983; and Eckstein and McDonough, 1983).

Contact Sites

Four sites in the Frankfort area and five sites in the Tawas City/East Tawas area were selected with the help of Sea Grant Agents in those areas. Contact sites were selected based on two primary factors: (1) to find potential questionnaire participants who were visiting the study area (either Frankfort or Tawas) on a vacation trip; and (2) to provide an adequate number of participants for sampling. In short, the sites selected were intended to provide a representative sample of tourists/vacationers in the two study areas (see Appendix A for a summary of the sampling sites utilized in the study).

Sampling

The survey population consisted of individuals, age twelve and older, who were vacationing in the Frankfort and Tawas areas during August, 1982. Data was gathered on four consecutive days from August 16-19, 1982.

The questionnaire was self administered. Potential respondents, age twelve and older, were approached by members of the research team and asked to complete the survey. Where groups of potential respondents were encountered, one person in the group was randomly selected to complete the survey. Individuals agreeing to participate were given a survey on a clipboard. If respondents had difficulties with the survey, members of the research team were nearby, available to provide assistance.

The sampling method varied slightly depending on the site being sampled. When there was a site where most or all of the people had to pass by, the data was collected by distributing surveys to people passing by. When people at a site were more sedentary, the data was collected by having the interviewer move across an area once or twice to pass out surveys.

The resulting sample was essentially a census of an area or of all the people passing by a specific point. This census was conducted under the limitation of one person only being able to manipulate six clipboards at one time thus allowing some people to get up and leave or pass by without receiving a questionnaire. A total of 287 questionnaires were collected over the four day period with at least twenty questionnaires from each of the nine sites. Table 2 presents a breakdown of the original sample by subsample.

Table 2
Breakdown of Original Sample by Subsample

SUBSAMPLE	n*
Frankfort	136 (47.4)
Tawas	151 (52.6)
Total	287 (100.0)

*Numbers in parentheses indicate the percentage.

Questionnaire

The questionnaire used in this study contained two major sections. The first section, was designed to operationalize visitors' images and perceptions of the two regions. The second section provided descriptive and socioeconomic information. The two major sections were comprised of the following types of questions:

<u>SECTION I. REGIONAL IMAGE/PERCEPTION INFORMATION</u>

- Adjective Checklist - Side "A"
- Adjective Checklist - Side "B"
- Attribute Checklist/Comparison

<u>SECTION II. DESCRIPTIVE/SOCIOECONOMIC INFORMATION</u>

- Rating of Side "A", Side "B", and Michigan
- Familiarity with Side "A" and Side "B"
- Trip Purpose
- Residence Status
- Socioeconomic Information (Sex, Age, Education, Income)

Since the emphasis in the study was on respondents' images and perceptions of Michigan, the initial set of instructions on the survey informed respondents that "we are interested in what you <u>think</u> about Michigan. It is not important that you have not been to all of the regions in the state to answer the questions". The first task asked of respondents was to complete two adjective checklists -- one for each coastal region. A forced choice checklist of regional attributes was then presented which asked respondents to indicate which of the two sides ("A" or "B") best provided for each of the set of attributes listed. The remainder of the survey asked respondents to provide descriptive and socioeconomic information.

A complete discussion of the original survey and sampling procedures can be found in Udd (1982). Also, for a further discussion of the study consult Fridgen and Klenosky (1985) (a copy of the original questionnaire can be found in Appendix A).

Study Variables

The variables of interest in the present study are the adjectives that make up the two adjective checklists (ACL's). The two adjective checklists were identical except that one focused on the northwest, or Lake Michigan, coast of the lower peninsula (to be referred to as Side "A" in the remainder of this analysis) and the other focused on the northeast, or Lake Huron, coast of the lower peninsula (to be referred to as Side "B").

The adjective checklists were created using three inputs: an adjective checklist used in a previous environmental perception study by Craik (1975), brochures of tourist attractions in Michigan, and discussions with the Sea Grant agent in Tawas. The adjectives fell roughly into two categories: descriptions of the area and descriptions of the social situation in the area. Antonyms for these words were used to create descriptive pairs. One adjective from each pair was randomly selected to be included in the survey. Lastly, the adjectives were randomly assigned to a location on the survey. To offset any ordering bias, on half of the questionnaires distributed, respondents were requested to describe the northeast coast first; on the other half, respondents were requested to describe the northwest coast first.

The instructions for the adjective checklists read as follows: "The following is a list of adjectives. Please read them quickly and check each one you would consider descriptive of coastal area "A" (or "B") shown on the map at left".

The adjectives were coded as dichotomous data. A one was recorded if the adjective was checked by the respondent and a two if the adjective was not checked.

The adjectives, in the order originally presented in the survey, are displayed in Table 3. This table shows the percentage of respondents, for each subsample and for the combined sample, checking each adjective as a descriptor of each side of the state.

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rest
deve
taste
class
heavy
busy

Table 3
Percent of Respondents Checking the Adjective as a Descriptor of Either Side "A" or Side "B" By Sub-Sample and Combined Sample

ADJECTIVE	FRANKFORT "A" SIDE	FRANKFORT "B" SIDE	TAWAS "A" SIDE	TAWAS "B" SIDE	COMBINED "A" SIDE	COMBINED "B" SIDE
accessible	73.5%	36.0%	49.0%	74.8%	60.6%	56.4%
clean	83.8%	31.6%	60.3%	77.5%	71.4%	55.7%
crowded	9.6%	8.8%	20.5%	23.2%	15.3%	16.4%
secluded	28.7%	14.0%	13.9%	12.6%	20.9%	13.2%
drab	0.0%	5.9%	0.7%	2.0%	0.3%	3.8%
flat	1.5%	11.8%	2.6%	10.6%	2.1%	11.1%
expensive	24.3%	10.3%	34.4%	13.9%	29.6%	12.2%
open	27.9%	12.5%	18.5%	23.8%	23.0%	18.5%
forested	72.8%	24.3%	34.4%	42.4%	52.6%	33.8%
friendly	72.8%	25.7%	44.4%	70.9%	57.8%	49.5%
unusual	15.4%	2.9%	7.9%	3.3%	11.5%	3.1%
peaceful	78.7%	25.7%	44.4%	62.3%	60.6%	44.9%
pleasant	78.7%	26.5%	51.7%	68.2%	64.5%	48.4%
middle class oriented	36.8%	20.6%	16.6%	45.0%	26.1%	33.4%
sandy	79.4%	14.0%	42.4%	62.9%	59.9%	39.7%
ugly	0.0%	0.7%	0.7%	0.7%	0.3%	0.7%
monotonous	0.0%	2.9%	0.7%	1.3%	0.3%	2.1%
clear	39.7%	8.1%	18.5%	32.5%	28.6%	20.9%
hostile	0.0%	0.7%	0.0%	1.3%	0.0%	1.0%
fun	73.5%	20.6%	55.0%	64.9%	63.8%	43.9%
family oriented	75.7%	28.7%	46.4%	72.2%	60.3%	51.6%
spirited	16.2%	4.4%	18.5%	25.2%	17.4%	15.3%
accepting	27.2%	8.8%	15.9%	26.5%	21.3%	18.1%
courteous	47.1%	16.9%	25.2%	42.4%	35.5%	30.3%
gracious	25.0%	9.6%	16.6%	20.5%	20.6%	15.3%
enjoyable	75.7%	27.9%	53.0%	72.8%	63.8%	51.6%
tacky	2.2%	1.5%	1.3%	2.6%	1.7%	2.1%
spectacular	31.6%	7.4%	17.9%	9.9%	24.4%	8.7%
primitive	17.6%	1.5%	7.3%	7.3%	12.2%	4.5%
remote	14.7%	6.6%	7.9%	6.6%	11.1%	6.6%
scenic	87.5%	32.4%	59.6%	68.9%	72.8%	51.6%
unspoiled	40.4%	10.3%	18.5%	24.5%	28.9%	17.8%
colorful	61.8%	19.1%	49.7%	52.3%	55.4%	36.6%
quaint	19.9%	2.2%	7.9%	11.9%	13.6%	7.3%
upper class oriented	17.6%	2.9%	21.9%	4.6%	19.9%	3.8%
alive	30.1%	7.4%	18.5%	25.8%	24.0%	17.1%
appealing	60.3%	20.6%	38.4%	47.0%	48.8%	34.5%
bright	33.8%	8.8%	18.5%	25.2%	25.8%	17.4%
commercial oriented	12.5%	5.1%	19.9%	11.3%	16.4%	8.4%
delightful	52.2%	10.3%	26.5%	36.4%	38.7%	24.0%
exciting	33.1%	8.1%	21.2%	30.5%	26.8%	19.9%
festive	15.4%	6.6%	15.2%	15.2%	15.3%	11.1%
outdoor oriented	77.2%	24.3%	43.7%	60.9%	59.6%	43.6%
horrible	0.0%	0.0%	0.0%	0.7%	0.0%	0.3%
out-of-the-way	11.0%	5.9%	11.9%	6.6%	11.5%	6.3%
lifeless	1.5%	2.2%	0.0%	0.7%	0.7%	1.4%
nondescript	0.7%	4.4%	0.7%	1.3%	0.7%	2.8%
noisy	2.2%	1.5%	2.6%	6.6%	2.4%	4.2%
interesting	55.1%	15.4%	37.7%	39.1%	46.0%	27.9%
tourist oriented	53.7%	18.4%	50.3%	53.0%	51.9%	36.6%
quiet	47.8%	14.0%	19.2%	31.8%	32.8%	23.3%
natural	66.2%	22.1%	38.4%	47.0%	51.6%	35.5%
restful	64.7%	19.1%	35.1%	47.0%	49.1%	33.8%
developed	11.0%	10.3%	18.5%	16.6%	15.0%	13.6%
tasteless	1.5%	1.5%	2.0%	2.6%	1.7%	2.1%
classy	10.3%	0.7%	5.3%	4.0%	7.7%	2.4%
heavy traffic	8.8%	8.1%	14.6%	15.9%	11.8%	12.2%
busy	12.5%	5.1%	20.5%	22.5%	16.7%	14.3%
	N = 136		N = 151		N = 287	

Analysis of Data

The investigator adhered to the following procedures in the data analysis stage of this research:

A. The number of variables to be analyzed in the adjective checklist was first reduced to those receiving endorsement rates of 10% or greater from all subsamples. This procedure follows the work of Craik (1975) and, in addition, helps improve the performance of the phi coefficients (discussed below).

B. Four separate factor analyses were performed: 1) Tawas of Lake Michigan, (2) Frankfort of Lake Michigan, (3) all respondents of Lake Huron, and (4) all respondents of Lake Michigan). The first two factor analyses, (1) and (2) addressed the first research question -- factor stability across samples; while analyses (3) and (4) focused on the second research question -- factor stability across regions. Since the data embodied in the adjective checklist is dichotomous, rather than using standard pearson product moment correlations to form the initial correlation matrix, phi coefficients were used. The use of phi coefficients rather than other correlational measures has received attention from Chase and Cheek (1979), Kim and Mueller (1978), and Rummel (1970) (Preliminary runs using the product moment correlation and phi coefficient formulas yielded identical results -- the same coefficients -- in fact, for dichotomous variables both use the same formulas. Therefore, though the theoretical suitability of phi coefficients is noted, this issue is not central to the analysis). Principal axis factoring was used as the method of initial factoring. This technique is similar to principal components except that communality estimates are used in the main diagonal of the correlation matrix rather than ones. Further, the use of correlation coefficients computed from dichotomies does not violate the assumptions of the principal axis factor model (Gorsuch, 1974). Squared multiple correlation coefficients were used as the initial communality estimates. The number of factors to be retained and rotated was determined by examining the number of factors with eigenvalues greater than one, the percent of variance explained by each factor, scree tests, and interpretability. The initial factor solution was rotated according to the Varimax criterion to aid in obtaining simple structure. The factor analyses were performed with the use of the Statistical Package for the Social Sciences

(Nie, Hull, et al., 1975) on the CDC Cyber 750 computer at Michigan State University. Factors were not labeled (interpreted) until the tests for the stability of factor structure (outlined below) were completed.

C. Criteria were established for assessing the extent of the match between structures prior to testing for factor structure stability.

D. Factor structure was first be tested for stability across samples for the same target region (Tawas of Lake Michigan and Frankfort of Lake Michigan) by comparing the factor loadings matrices. Use of the factor loadings matrix is appropriate when comparing factor structures from different sets of cases on the same set of variables. The following comparison approaches were used: visual comparisons (configuration, complexity, variance explained, number of factors, and communalities) and vector comparisons (Pearson's product moment correlation, root mean square, coefficient of congruence, and the S-index).

E. Factor structure was then tested for stability across target regions (Lake Huron versus Lake Michigan) for the same sample (in this case the combined sample). For the most part, all the comparisons in this section used the factor loadings matrices. In addition, however, the correlation of factor scores was also computed. Comparison of factor scores is called for when comparing the factor structure of the same set of cases across two sets of variables. Problems with generating factor scores from dichotomous data (Kim and Mueller, 1978) are recognized, and thus, may be a limitation of this analysis. The following comparison techniques will be used: visual comparisons (configuration, complexity, variance explained, number of factors, and communalities) and vector comparisons (Pearson's product moment correlation -- of the factor loadings and factor scores, root mean square, and coefficient of congruence). A Pascal program was written to facilitate the calculation of the root mean square, the coefficient of congruence, and the S-Index for both the comparison across samples and across regions. A listing of that program (FACCOMP) is included in Appendix B.

F. Once the factors which remained stable across samples and regions were identified, they were interpreted and named.

Reduction of the Variable Set

As discussed in the previous chapter, the first step in the analysis was to reduce the original set of adjectives to those which received attention by at least ten percent of the respondents. Gorsuch (1974) suggests that dichotomous variables with splits (the percentage of 1's versus the percentage of 0's) beyond 10%/90% or 90%/10% not be included in factor analysis because they could too severely limit the potential range of the phi correlation coefficient. Previous studies factor analyzing dichotomous data have also followed this procedure (Chase and Cheek, 1979; Chase, et al., 1980; and Craik, 1975).

In the present study, the majority of the total sample of tourists attributed the following characteristics as descriptors of the two regions: scenic, accessible, clean, pleasant, enjoyable, family-oriented, fun, peaceful, and outdoor-oriented. The array of additional noteworthy descriptors is considerable. A total of 27 of the 58 adjectives received endorsements by at least ten percent of the total sample of visitors to the two areas (Table 3). (None of the original adjectives were endorsed by more than ninety percent of the total sample.) These 27 adjectives are intended to operationalize respondents' images and perceptions of the two coastal areas -- they comprise the data set used for the remainder of the analysis.

accessible	middle-class-oriented	appealing
clean	sandy	delightful
secluded	fun	outdoor-oriented
expensive	family oriented	interesting
open	courteous	tourist-oriented
forested	enjoyable	quiet
friendly	scenic	natural
peaceful	unspoiled	restful
pleasant	colorful	developed

Criteria for Comparing Factor Structure

A major question that arises is how does one interpret the results of the various techniques used to assess factor similarity? Specifically, what criteria does one look for to identify invariant factors? As Chase, Kasulis, and Lusch (1980) point out, there is little practical guidance in the literature.

For this research, which employs a number of techniques to compare factor similarity, no single comparison measure will be used to determine the stability of a given factor. Instead, the results of all the methods of comparison will be considered before assessing a factor's stability. Nevertheless, to guide the analysis, it is necessary to establish operational criteria for each similarity measure. Relevant to establishing this criteria, the visual approaches to factor comparison will be presented first, followed by the vector approaches.

Visual Comparisons

The visual methods of comparing factor structure are: the number of factors (with eigenvalues greater than one), configuration of factor loadings, factor complexity, percent of variance explained, and communalities of the variables. For these methods the criteria for factor stability are somewhat subjective. As long no substantial deviation exists between the factor matrices on each of these factor comparison measures, factor structure can be considered stable. Specific criteria for each measure are as follows:

1. Number of factors with eigenvalues greater than one -- +/-1 between matrices.

2. Configuration of loadings -- at least two variables loading highly on a given set of factors between matrices.

3. Complexity -- for the variables -- the same complexity of a variable on a set of factors across matrices (i.e. the same variable loading highly on two factors on two matrices); for the factors -- a factor found in one matrix is identifiable in one or more factors on the second matrix.

4. Percent of variance explained -- +/- 2 percent between factors and +/- 5 percent between matrices.

5. Communality of the variables -- variables whose communality remains in the same third across two matrices. (For this comparison the variables will be divided into three communality categories -- top third, middle third, and bottom third -- depending on the magnitude of the communality for a given variable).

Vector Comparisons

As outlined in the literature review, the vector or factor to factor comparison approaches are: Pearson's product moment correlation coefficient, root mean square (RMS), coefficient of congruence (CC), and the salient variable index (S-Index). These methods entail a more objective means of comparison than the visual comparisons and require specific criteria to assess factor similarity across factor matrices:

1. Pearson's correlation coefficient (r) -- correlation coefficients greater than .40 that are statistically significant at the Prob < .05 level.
2. Root mean square (RMS) -- coefficients between 0 and .10.
3. Coefficient of congruence (CC) -- coefficients in absolute value of .80 or greater.
4. Salient Variable Index (S-Index) -- coefficients in absolute value of .80 or greater.

CHAPTER IV

RESULTS

This chapter is divided into two main sections. The first section addresses research question (1); the comparison of factor structures across samples. In the second section, the focus is on research question (2), comparing factor structure across regions. Each section employs both visual and vector factor comparison approaches to assess the stability of the factor structure underlying respondents' images of tourism destinations.

Comparison Across Samples

To address the first research question, this section focuses on determining whether any of the criteria which underlie respondents' images of tourism destinations remain stable across different samples of respondents. The research design in this type of factor comparison involves the same variables and different groups of respondents. The variables used in this analysis were the reduced set of 27 adjectives discussed in the previous chapter. The formulation of the two subsamples of respondents used for this comparison is the topic of the following section. The remainder of this section is divided into three major headings: the number of factors retained for rotation, visual comparison approaches, and finally vector comparison approaches.

The Subsamples

The first step at this stage was to develop the subsamples of respondents for input into the factor analyses. Two criteria were considered in creating the subsamples. The first criteria was homogeneity within each subsample. The respondents comprising each subsample had to be as alike as possible. The second criteria was sample size. Each subsample had to be large enough to assure that the results of the factor analyses were reliable.

Homogeneity. Respondents were first assigned to one of two groups depending upon their survey site -- Frankfort or Tawas. To insure homogeneity within these two samples, only respondents who checked at least one adjective in a checklist were retained. In this way, only respondents who were familiar enough with the target region were input into the factor analysis. The number of respondents who completed an adjective checklist (ACL) for each coastal region by subsample is presented in Table 4 below.

Table 4
Number of Respondents Completing Each Adjective Checklist (ACL) by Subsample*

SUBSAMPLE	ACL FOR SIDE "A"	ACL FOR SIDE "B"
Frankfort	134 (51.7)	67 (31.5)
Tawas	125 (48.3)	146 (68.5)
Total	259 (100.0)	213 (100.0)

*Numbers in parentheses indicate the percentage.

<u>Sample size</u>. The second criteria used to create the subsamples was size. The size of each subsample had to be large enough to ensure that the correlations used as the input for the factor analyses accurately reflected the correlations for the underlying population of tourists. The generally accepted "rule of thumb" in factor analysis is to have at least five subjects for each variable being measured, with an absolute minimum of 100 subjects (Kass and Tinsley, 1979, p. 124).

Therefore, to factor analyze the 27 regional image variables the sample size had to be roughly 135 (27 variables times 5 cases per variable). Obviously, the number of respondents in the Frankfort sample completing an ACL for Side "B" (N = 67) is well below the suggested minimum of 100 cases, precluding a comparison between samples for this side of the state. However, the sample sizes for the two groups completing an ACL for Side "A" is over 100 (for the Frankfort subsample N = 134 and for the Tawas subsample N = 125) and close enough to the benchmark of 135 to serve as the two subsamples for this particular comparison.

In summary, the variables used for the comparison of factor structure across samples are the 27 adjectives used to describe Side "A" -- the northern Lake Michigan coastline. The two subsamples consist of 134 respondents surveyed in Frankfort and 125 respondents surveyed in Tawas. The next section discusses the decision regarding the number of factors to retain for factor rotation and subsequent factor comparison.

The Number of Factors Retained For Rotation

The 27 adjectives above were then factor analyzed to identify the dimensions underlying respondents' images of the target region (Side "A") for each subsample. The two factor analyses indicated that the patterns of interrelationships in the data were very similar (Table 5). The decision to make at this point centered on the number of factors to extract for rotation for both subsamples. Four methods to determine the number of factors to retain were considered: the number of factors with eigenvalues greater than one, percent of variance explained by each factor, scree tests, and interpretability.

Table 5
Eigenvalues and Percent of Total Variance Explained*
Before Factor Rotation by Subsample

	EIGENVALUES		PERCENT OF TOTAL VARIANCE EXPLAINED		CUM. PERCENT OF TOTAL VARIANCE EXPLAINED	
FACTOR	FRANKFORT	TAWAS	FRANKFORT	TAWAS	FRANKFORT	TAWAS
1	6.564	6.422	24.3%	23.8%	24.3%	23.8%
2	1.914	1.885	7.1%	7.0%	31.4%	30.8%
3	1.600	1.689	5.9%	6.3%	37.3%	37.0%
4	1.431	1.587	5.3%	5.9%	42.6%	42.9%
5	1.252	1.392	4.6%	5.2%	47.3%	48.1%
6	1.197	1.196	4.4%	4.4%	51.7%	52.5%
7	1.117	1.175	4.1%	4.4%	55.8%	56.8%
8	1.018	1.055	3.8%	3.9%	59.6%	60.7%
9	0.924	1.014	3.4%	3.8%	63.0%	64.5%
10	0.890	0.915	3.3%	3.4%	66.3%	67.9%
11	0.835	0.842	3.1%	3.1%	69.4%	71.0%
12	0.829	0.785	3.1%	2.9%	72.5%	73.9%
13	0.740	0.740	2.7%	2.7%	75.2%	76.7%
14	0.695	0.692	2.6%	2.6%	77.8%	79.2%
15	0.675	0.639	2.5%	2.4%	80.3%	81.6%
16	0.632	0.614	2.3%	2.3%	82.6%	83.9%
17	0.617	0.592	2.3%	2.2%	84.9%	86.1%
18	0.578	0.560	2.1%	2.1%	87.1%	88.1%
19	0.525	0.478	1.9%	1.8%	89.0%	89.9%
20	0.475	0.457	1.8%	1.7%	90.8%	91.6%
21	0.443	0.444	1.6%	1.6%	92.4%	93.2%
22	0.423	0.409	1.6%	1.5%	94.0%	94.8%
23	0.387	0.394	1.4%	1.5%	95.4%	96.2%
24	0.377	0.297	1.4%	1.1%	96.8%	97.3%
25	0.324	0.274	1.2%	1.0%	98.0%	98.3%
26	0.291	0.234	1.1%	0.9%	99.1%	99.2%
27	0.244	0.218	0.9%	0.8%	100.0%	100.0%

* Based on principal axis factoring.

<u>The Number of Factors with Eigenvalues Greater Than One</u>. The "rule of thumb" in factor analysis is to extract and rotate only those factors that have eigenvalues greater than one. If one uses this criterion, however, the Tawas sample should have nine factors retained and the Frankfort sample eight (Table 5). For the Tawas sample, at nine factors retained, 64.5% of the total variation in the data is explained; for the Frankfort sample, at eight factors, 59.6% is explained.

<u>Percent of Variance Explained</u>. Another "rough" criterion specifies that each factor to be rotated explain at least five percent of the total variation in the data. Using this cutoff, five factors should be extracted for the Tawas sample and four for the Frankfort sample (Table 5).

<u>Scree Test</u>. Another method for determining the number of factors to extract for rotation is to perform a scree test (Cattell, 1966). A scree test is basically a plot of the eigenvalues on the factors. One looks for the point of discontinuity on the plot, the point where the "scree" begins, to determine the cutoff for the number of factors to retain for rotation. The scree tests for the two subsamples (Figures 1 and 2) display a notably similar pattern. However, they fail to indicate an obvious point of discontinuity to use as a cutoff for the number of factors to retain for rotation.

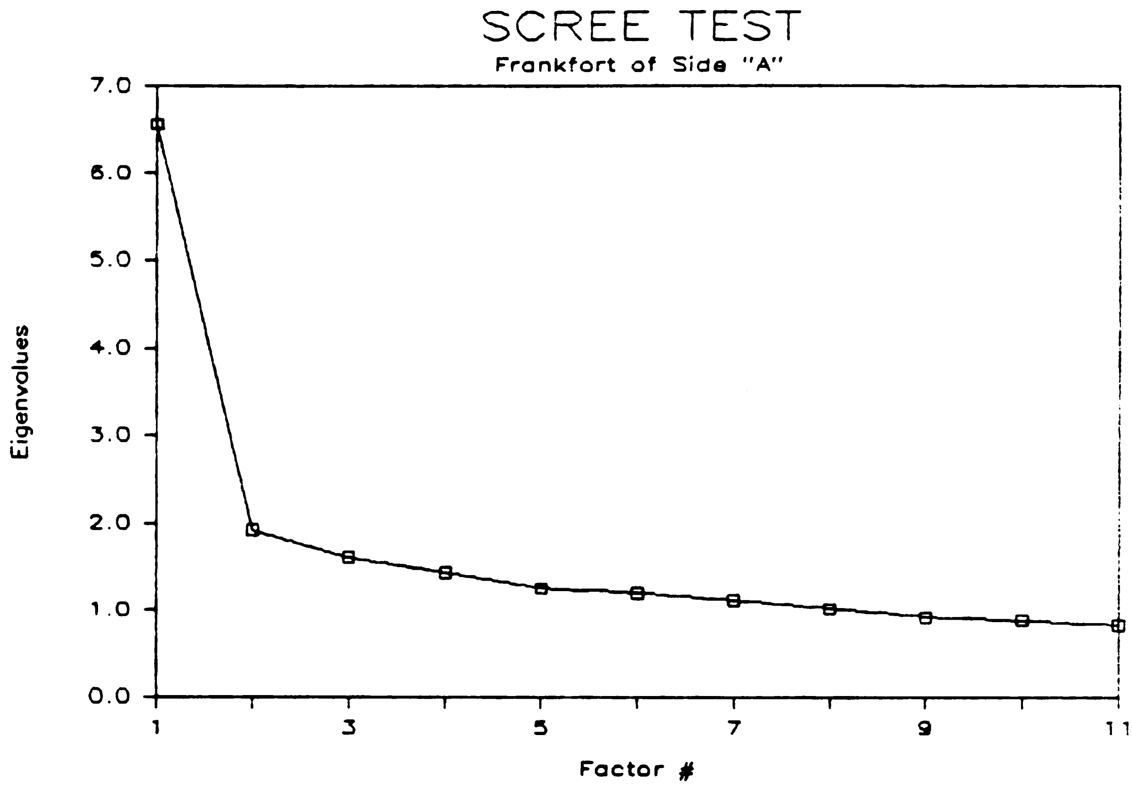

Figure 1 -- Scree Test for Frankfort of Side "A"

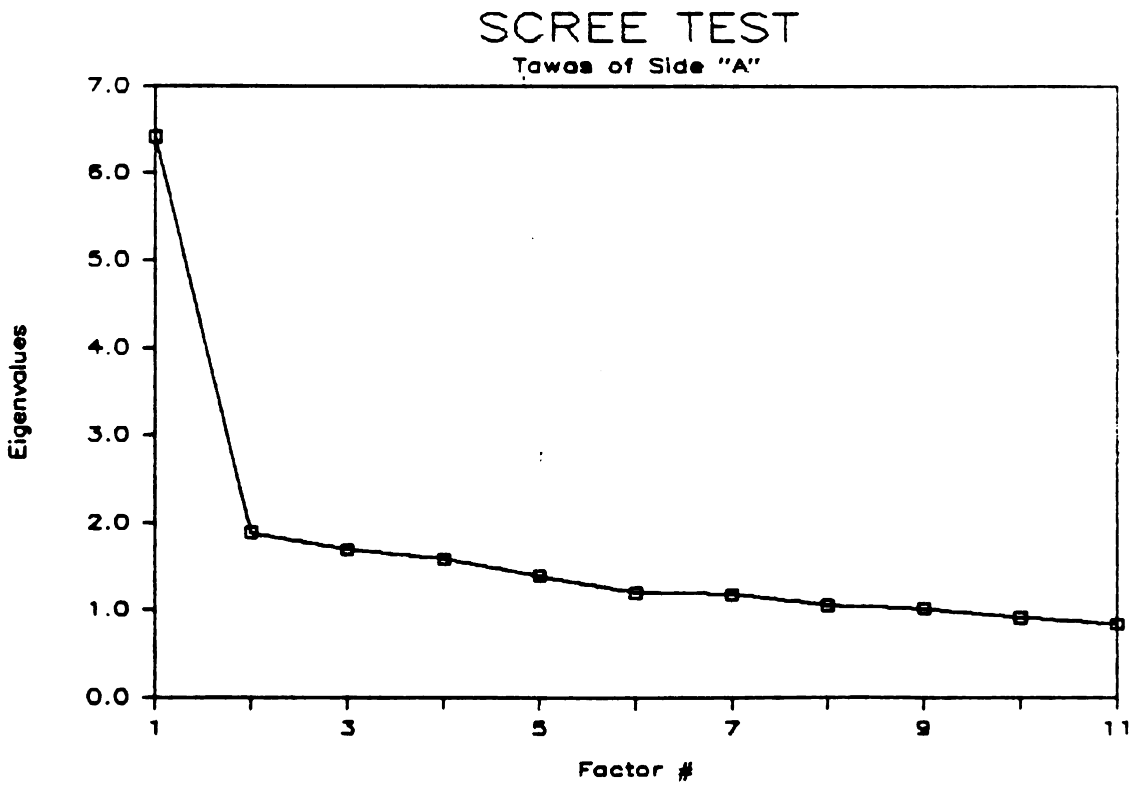

Figure 2 -- Scree Test for Tawas of Side "A"

Interpretability. The last method used to resolve the number of factors decision was interpretability. Runs were made specifying eight and nine factors for each sample. The results for the nine factor solution did not improve the interpretability of the rotated matrix; it only added a specific factor -- one on which only one variable loaded. In short, the results at eight factors were better than at nine.

The four methods used to determine the number of factors to retain for rotation indicated a range between four and nine factors. At four factors only 42.9% and 42.6% of the total variation in the data would be explained for the Tawas and Frankfort samples respectively -- which is not very high. At nine factors 64.5% and 63.0% of the total variance would be explained. But, at nine factors, the eigenvalue for the Frankfort sample is .924, which is below the cutoff of 1.0. Further, at nine factors there is no substantial improvement from the perspective of interpretability. These results led to the decision to retain eight factors from each subsample for rotation and subsequent comparison.

Visual Comparisons

The visual comparisons made across samples in this study are: (1) the number of factors with eigenvalues greater than one, (2) the percent of total variance explained, (3) the configuration of factor loadings, (4) the complexity of the factor structure, and (5) the communalities of the variables.

The Number of Factors with Eigenvalues Greater Than One. The previous section on the number of factors to extract focused on determining the number of factors to retain for rotation. This section explicitly compares the number of factors with eigenvalues greater than one (in the initial factor matrices) as an indicator of the similarity of factor structure across samples.

As discussed in the previous section one of the "rules of thumb" in factor analysis is to extract and rotate only those factors with eigenvalues greater than one. This criterion for factor rotation is popular for its simplicity and relatively accurate performance. For the present study, the criterion for this indicator of factor structure similarity specifies that the number of factors with eigenvalues greater than one for the two matrices be within one.

As displayed in Table 5, eight factors for the Frankfort sample and nine factors for the Tawas sample had eigenvalues greater than one. A difference which may be related to differences in respondents' familiarity with the target region. Obviously, the Tawas sample is not likely to be as familiar as the Frankfort sample with the northwestern coast of Lake Michigan -- Side "A". Thus, the Frankfort sample's fewer factors may indicate greater cohesion in the factor structure for that group in comparison with the Tawas sample. The significance and magnitude of this difference, however, is difficult to assess. Is it an actual difference or just a random fluctuation in the data? There are no established methods to determine which is the case. Nevertheless, the number of factors with eigenvalues greater than one is within one for the two matrices. According to the established criterion, this finding provides an indicator of similarity for the factor structures for the two samples.

Percent of Variance Explained. The percent of total variance explained was also considered in determining the number of factors to extract for rotation. The percent of total variance explained measures the relative importance of the factors in accounting for the relationships in the data. Here, the percent of variance explained by the two factor matrices prior to rotation serves as another indicator of the similarity of factor structure across samples.

The criterion for this measure was established for both factor to factor comparisons and matrix to matrix comparisons. For individual factor to factor comparisons, the benchmark is a +/- two percent difference between the two subsamples on a given factor. Regarding the matrix to matrix comparison, the factor structure of two factor matrices is similar when (at the cutoff for factors to retain for rotation) the difference in the percent of total variance explained is +/- five percent between the two.

Comparing factor to factor, the percent of total variance explained by the two factor matrices is very similar. Moving from Factor 1 to Factor 27 one can see a notable pattern in both factor matrices (Table 5). The maximum difference between the percent of total variance explained for the two subsamples on a given pair of factors is .6 percent. This is well within the criterion range of +/- 2 percent.

For the matrix to matrix comparison, at the cutoff point of eight factors (the number of factors retained for rotation), the percent of total variance explained by the Frankfort sample is 59.6 percent (Table 5). For the Tawas sample it is 60.7 percent. The difference between the two, then, is 1.1 percent which is well within the standard for this measure of factor structure similarity.

These findings increases our confidence in the stability of the factor structure of destination images across samples. It suggests that the underlying factor structure in the data is not specific to a particular subsample, but rather is inherent in the domain (of destination images) under investigation. The following section continues this analysis by examining the rotated factor matrices; it begins by comparing the configuration of factor loadings across samples.

Configuration of the Loadings. The varimax rotated factor matrices for the two samples on the twenty-seven regional image variables are presented separately in Tables

6 and 7; and together in Table 8. Factors for the Frankfort sample are labeled F1 to F8; for the Tawas sample they are labeled T1 to T8.

To aid in assessing factor stability, the criterion pertinent to the configuration of factor loadings specifies that a similar factor across two matrices is one in which (at least) two variables load highly on that factor across matrices. A high loading is operationally defined as a variable loading greater than .38 on a factor.

Summaries of the variables loading greater than .38 on the factors for the Frankfort sample are displayed from two perspectives in Tables 9 and 10. Table 9 presents the configuration of the high loading variables in the order displayed on the original factor matrix. Table 10 presents the same information, but ranks the loadings from highest to lowest for each factor.

Factor F1 had high loadings on seven variables including: sandy, fun, enjoyable, colorful, appealing, outdoor-oriented, and interesting. The second factor (F2) loaded also loaded seven variables, which were: secluded, peaceful, unspoiled, delightful, quiet, natural, restful. Factor F3 had high loadings on three variables: friendly, family-oriented, and courteous. Factor F4 loaded with clean, pleasant, and scenic. The fifth factor for this sample (F5) contained high loadings on accessible and middle-class-oriented. The sixth factor (F6) loaded with forested and restful (note: forested had a positive loading,

Table 6
Varimax Rotated Factor Matrix For Frankfort Sample of Side "A" (N = 134)

VARIABLE	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6	FACTOR 7	FACTOR 8	COMMUNALITY
accessible	0.08774	-0.24134	0.23382	0.26548	0.47470	-0.15870	-0.05719	0.33781	55.9%
clean	0.27390	0.11263	0.22710	0.39152	0.08690	0.11083	0.12035	0.10618	33.8%
secluded	0.12956	0.48357	-0.10518	0.06593	-0.01077	-0.00284	-0.01167	0.03305	26.7%
expensive	-0.15971	-0.05950	-0.05561	-0.16705	-0.41262	0.00763	0.38948	0.13683	40.1%
open	0.00301	0.20095	0.11537	0.14538	0.24821	-0.04039	0.18868	0.04181	17.5%
forested	0.25562	0.09143	0.16855	0.27116	0.14672	0.47057	-0.08530	-0.00228	42.6%
friendly	0.19686	0.03063	0.39948	0.03753	0.15876	0.03481	0.01304	0.26550	29.8%
peaceful	0.08425	0.43997	0.02370	0.31396	0.12843	-0.02109	-0.07640	-0.08564	33.0%
pleasant	0.16592	0.23674	0.08254	0.59475	-0.02839	-0.02015	0.17139	0.12951	49.1%
middle-class-oriented	0.15005	0.13413	0.12640	-0.06198	0.67133	0.10555	0.01836	0.02110	52.3%
sandy	0.43033	0.10834	0.02675	0.27582	0.09749	0.06386	-0.00061	0.14836	30.9%
fun	0.62325	0.12749	0.06852	0.04426	0.04465	0.02821	0.07363	0.05185	42.2%
family-oriented	0.11921	0.11014	0.47237	0.04788	0.22157	-0.13997	-0.02106	0.00239	32.1%
courteous	0.16914	0.11927	0.67478	0.13735	0.08584	0.09443	-0.02236	0.08584	54.1%
enjoyable	0.73891	0.06954	0.27861	0.16852	0.13551	-0.14307	0.00819	-0.00349	69.6%
scenic	0.33448	0.20185	0.26602	0.45064	0.15287	0.00307	-0.08934	-0.13797	47.7%
unspoiled	0.14677	0.54990	0.20542	-0.06382	0.13544	0.24572	-0.08582	0.04281	45.8%
colorful	0.41615	0.14259	0.25016	0.25447	-0.04482	0.21970	0.09522	0.20933	42.4%
appealing	0.46466	0.16654	0.24906	0.29958	0.19591	-0.01016	0.22608	0.04199	48.7%
delightful	0.26800	0.48367	0.26854	0.09581	0.07662	-0.20256	0.13566	0.46920	67.3%
outdoor-oriented	0.46342	0.19426	0.30872	-0.00648	0.21709	0.02314	0.00805	-0.06728	40.0%
interesting	0.43360	0.20946	0.10086	0.26566	-0.07858	0.08770	-0.26811	0.35448	52.4%
tourist-oriented	0.09442	-0.00839	0.37184	0.11445	0.03764	0.04798	0.23189	-0.00226	21.8%
quiet	0.05441	0.62757	0.20237	0.19206	0.01559	-0.17442	-0.03026	0.09666	51.6%
natural	0.21993	0.44943	0.31684	0.20335	0.08103	0.07926	-0.21781	-0.08527	46.0%
restful	0.25928	0.42429	0.15645	0.19047	0.10855	-0.54779	-0.12114	0.08358	64.2%
developed	0.11857	-0.11155	0.05482	0.10212	0.01812	0.00038	0.50870	-0.02873	30.0%

Table 7
Varimax Rotated Factor Matrix For Tawas Sample of Side "A" (N = 125)

VARIABLE	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6	FACTOR 7	FACTOR 8	COMMUNALITY
accessible	0.09160	0.08669	0.02309	0.08390	0.65209	0.01319	-0.12459	0.09986	47.4%
clean	0.40502	0.10861	0.07377	0.28127	0.31929	0.07976	0.22863	-0.08845	42.9%
secluded	-0.06041	0.20802	0.04593	0.13988	0.04261	0.06733	0.45227	0.01299	28.0%
expensive	-0.26630	-0.23615	-0.07549	-0.08238	0.09583	0.04559	-0.08209	0.07690	16.3%
open	0.31148	-0.10061	0.11791	0.08002	-0.04188	0.05125	0.70478	0.13873	64.8%
forested	-0.04527	0.64793	-0.08916	0.08132	0.03369	0.04219	0.05753	0.15209	46.6%
friendly	0.21624	0.50002	0.31883	0.00653	0.04649	0.06989	0.15322	-0.09128	43.7%
peaceful	0.08285	0.29290	0.58596	0.33625	0.05094	0.11756	0.33413	-0.07950	68.3%
pleasant	0.14054	-0.01113	0.74279	0.20758	-0.05395	0.12295	0.11756	0.13738	66.5%
middle-class-oriented	0.12279	0.34058	0.15043	0.18544	0.21348	-0.11130	0.13770	0.15367	28.9%
sandy	0.15747	0.00768	0.07989	0.05693	0.06391	0.84501	0.15963	0.09585	78.7%
fun	0.52074	0.20376	0.17163	-0.00890	0.07186	0.30033	0.14951	-0.13714	47.9%
family-oriented	0.18022	0.34965	0.43155	0,21150	0.15611	0.03071	-0.02264	0.16742	44.0%
courteous	0.28952	0.45306	0.31444	0.13980	0.19900	0.01962	-0.00603	-0.13140	46.5%
enjoyable	0.56074	-0.10819	0.20961	0.05947	0.47317	0.13554	-0.02091	0.01503	61.7%
scenic	0.23567	0.08604	0.01061	0.18546	0.16222	0.15747	0.02406	0.34603	26.9%
unspoiled	0.26718	0.30729	0.00196	0.31966	-0.04207	0.10700	0.04093	0.09947	29.3%
colorful	0.62542	-0.00466	0.06499	0.14552	-0.01372	0.16203	0.10329	0.15646	47.8%
appealing	0.34450	0.08530	0.36046	0.15527	0.23200	0.42253	-0.06876	-0.02494	51.8%
delightful	0.25451	0.38697	0.21567	0.15717	0.08688	0.27942	-0.00882	0.09370	38.0%
outdoor-oriented	-0.00628	0.17142	0.13532	0.14737	0.08263	0.19793	0.23548	0.16035	19.7%
interesting	0.51608	0.27524	0.07375	0.06473	0.04437	-0.03685	-0.08058	0.13887	38.1%
tourist-oriented	0.00604	0.07926	0.07259	-0.11999	0.16311	0.01883	0.10800	0.68715	53.7%
quiet	-0.01056	0.06812	0.25598	0.64844	0.13211	0.03367	0.21258	-0.09549	56.4%
natural	0.31481	0.30875	0.18292	0.48525	-0.17427	0.05174	0.06589	0.19580	53.9%
restful	0.30630	0.15774	0.30539	0.56608	0.05284	0.10590	0.10401	-0.07751	56.3%
developed	-0.06053	0.05120	-0.01083	-0.06175	0.48601	0.09883	0.19183	0.16028	31.9%

Table 8
Varimax Rotated Factor Matrix For Both Samples of Side "A"

VARIABLE	FACTOR 1		FACTOR 2		FACTOR 3		FACTOR 4		FACTOR 5		FACTOR 6		FACTOR 7		FACTOR 8	
	F1	T1	F2	T2	F3	T3	F4	T4	F5	T5	F6	T6	F7	T7	F8	T8
accessible	0.09	0.09	-0.24	0.09	0.23	0.02	0.27	0.08	(0.47)	(0.65)	-0.16	0.01	-0.06	-0.12	0.34	0.10
clean	0.27	(0.41)	0.11	0.11	0.23	0.07	(0.39)	0.28	0.09	0.32	0.11	0.08	0.12	0.23	0.11	-0.09
secluded	0.13	-0.06	(0.48)	0.21	-0.11	0.05	0.07	0.14	-0.01	0.04	-0.00	0.07	-0.01	(0.45)	0.03	0.01
expensive	-0.16	-0.27	-0.06	-0.24	-0.06	-0.08	-0.17	-0.08	-(0.41)	0.10	0.01	0.05	(0.39)	-0.08	0.14	0.08
open	0.00	0.31	0.20	-0.10	0.12	0.12	0.15	0.08	0.25	-0.04	-0.04	0.05	0.19	(0.70)	0.04	0.14
forested	0.26	-0.05	0.09	(0.65)	0.17	-0.09	0.27	0.08	0.15	0.03	(0.47)	0.04	-0.09	0.06	-0.00	0.15
friendly	0.20	0.22	0.03	(0.50)	(0.40)	(0.32)	0.04	0.01	0.16	0.05	0.03	0.07	0.01	0.15	0.27	-0.09
peaceful	0.08	0.08	(0.44)	0.29	0.02	(0.59)	0.31	0.34	0.13	0.05	-0.02	0.12	-0.08	0.33	-0.09	-0.08
pleasant	0.17	0.14	0.24	-0.01	0.08	(0.74)	(0.59)	0.21	-0.03	-0.05	-0.02	0.12	0.17	0.12	0.13	0.14
middle-class-oriented	0.15	0.12	0.13	0.34	0.13	0.15	-0.06	0.19	(0.67)	0.21	0.11	-0.11	0.02	0.14	0.02	0.15
sandy	(0.43)	0.16	0.11	0.01	0.03	0.08	0.28	0.06	0.10	0.06	0.06	(0.85)	-0.00	0.16	0.15	0.10
fun	(0.62)	(0.52)	0.13	0.20	0.07	0.17	0.04	-0.01	0.04	0.07	0.03	0.30	0.07	0.15	0.05	-0.14
family-oriented	0.12	0.18	0.11	0.35	(0.47)	(0.43)	0.05	0.21	0.22	0.16	-0.14	0.03	-0.02	-0.02	0.00	0.17
courteous	0.17	0.29	0.12	(0.45)	(0.67)	0.31	0.14	0.14	0.09	0.20	0.09	0.02	-0.02	-0.01	0.09	-0.13
enjoyable	(0.74)	(0.56)	0.07	-0.11	0.28	0.21	0.17	0.06	0.14	(0.47)	-0.14	0.14	0.01	-0.02	-0.00	0.02
scenic	0.33	0.24	0.20	0.09	0.27	0.01	(0.45)	0.19	0.15	0.16	0.00	0.16	-0.09	0.02	-0.14	0.35
unspoiled	0.15	0.27	(0.55)	0.31	0.21	0.00	-0.06	0.32	0.14	-0.04	0.25	0.11	-0.09	0.04	0.04	0.10
colorful	(0.42)	(0.63)	0.14	-0.00	0.25	0.06	0.25	0.15	-0.04	-0.01	0.22	0.16	0.10	0.10	0.21	0.16
appealing	(0.46)	0.34	0.17	0.09	0.25	0.36	0.30	0.16	0.20	0.23	-0.01	(0.42)	0.23	-0.07	0.04	-0.02
delightful	0.27	0.25	(0.48)	(0.39)	0.27	0.22	0.10	0.16	0.08	0.09	-0.20	0.28	0.14	-0.01	(0.47)	0.09
outdoor-oriented	(0.46)	-0.01	0.19	0.17	0.31	0.14	-0.01	0.15	0.22	0.08	0.02	0.20	0.01	0.24	-0.07	0.16
interesting	(0.43)	(0.52)	0.21	0.28	0.10	0.07	0.27	0.06	-0.08	0.04	0.09	-0.04	-0.27	-0.08	0.35	0.14
tourist-oriented	0.09	0.01	-0.01	0.08	0.37	0.07	0.11	-0.12	0.04	0.16	0.05	0.02	0.23	0.11	-0.00	(0.69)
quiet	0.05	-0.01	(0.63)	0.07	0.20	0.26	0.19	(0.65)	0.02	0.13	-0.17	0.03	-0.03	0.21	0.10	-0.10
natural	0.22	0.31	(0.45)	0.31	0.32	0.18	0.20	(0.49)	0.08	-0.17	0.08	0.05	-0.22	0.07	-0.09	0.20
restful	0.26	0.31	(0.42)	0.16	0.16	0.31	0.19	(0.57)	0.11	0.05	(-0.55)	0.11	-0.12	0.10	0.08	-0.08
developed	0.12	-0.06	-0.11	0.05	0.05	-0.01	0.10	-0.06	0.02	(0.49)	0.00	0.10	(0.51)	0.19	-0.03	0.16

Note: Parentheses indicate variables loading greater than +/-0.38 on a factor.

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Table 9
Configuration of the Highest Loadings Variables
for Frankfort Sample of Side "A" (N = 134)

VARIABLE	F1	F2	F3	F4	F5	F6	F7	F8
accessible					0.47			
clean				0.39				
secluded		0.48						
expensive							0.39	
open								
forested						0.47		
friendly			0.40					
peaceful		0.44						
pleasant				0.59				
middle-class-oriented					0.67			
sandy	0.43							
fun	0.62							
family-oriented			0.47					
courteous			0.67					
enjoyable	0.74							
scenic				0.45				
unspoiled		0.55						
colorful	0.42							
appealing	0.46							
delightful		0.48						0.47
outdoor-oriented	0.46							
interesting	0.43							
tourist-oriented								
quiet		0.63						
natural		0.45						
restful		0.42				-0.54		
developed							0.51	

while restful had a negative loading on this factor). The seventh factor, Factor F7 loaded two variables: expensive and developed. Finally, Factor F8 loaded a single variable: delightful.

Table 10
Highest Loading Variables Ranked by Factor
for the Frankfort Sample of Side "A" (N = 134)

VARIABLE	F1	F2	F3	F4	F5	F6	F7	F8
enjoyable	0.74							
fun	0.62							
appealing	0.46							
outdoor-oriented	0.46							
interesting	0.43							
sandy	0.43							
colorful	0.42							
quiet		0.63						
unspoiled		0.55						
delightful		0.48						
secluded		0.48						
natural		0.45						
peaceful		0.44						
restful		0.42						
courteous			0.67					
family-oriented			0.47					
friendly			0.40					
pleasant				0.59				
scenic				0.45				
clean				0.39				
middle-class-oriented					0.67			
accessible					0.47			
forested						0.47		
restful						-0.55		
developed							0.51	
expensive							0.39	
delightful								0.47

The high loading variables for the Tawas sample's factor matrix are similarly summarized in Tables 11 and 12. The first factor in that matrix, Factor T1, loaded the following variables: clean, fun, enjoyable, colorful, and interesting. Factor T2 loaded with the following: forested, friendly, courteous, and delightful. The third factor (T3) contained high loadings on: peaceful, pleasant,

Table 11
Configuration of the Highest Loadings Variables
for Tawas Sample of Side "A" (N = 125)

VARIABLE	T1	T2	T3	T4	T5	T6	T7	T8
accessible					0.65			
clean	0.41							
secluded							0.45	
expensive								
open							0.70	
forested		0.65						
friendly		0.50						
peaceful			0.59					
pleasant			0.74					
middle-class-oriented								
sandy						0.85		
fun	0.52							
family-oriented			0.43					
courteous		0.45						
enjoyable	0.56				0.47			
scenic								
unspoiled								
colorful	0.63							
appealing						0.42		
delightful		0.39						
outdoor-oriented								
interesting	0.52							
tourist-oriented								0.69
quiet				0.65				
natural				0.49				
restful				0.57				
developed					0.49			

and family-oriented. Factor four, or T4, loaded highly with the following: quiet, natural, and restful. Three variables loaded on the fifth factor for this sample (T5): accessible, enjoyable, and developed. Factor T6 had high loadings on: sandy and appealing; and the seventh factor T7 had high loadings on: secluded and open. Finally, the last factor for this sample (T8) loaded only a single variable: tourist-oriented.

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Table 12
Highest Loading Variables Ranked by Factor for the Tawas Sample of Side "A" (N = 125)

VARIABLE	T1	T2	T3	T4	T5	T6	T7	T8
colorful	0.63							
enjoyable	0.56							
fun	0.52							
interesting	0.52							
clean	0.41							
forested		0.65						
friendly		0.50						
courteous		0.45						
delightful		0.39						
pleasant			0.74					
peaceful			0.59					
family-oriented			0.43					
quiet				0.65				
restful				0.57				
natural				0.49				
accessible					0.65			
developed					0.49			
enjoyable					0.47			
sandy						0.85		
appealing						0.42		
open							0.70	
secluded							0.45	
tourist-oriented								0.69

A comparison of the configuration of the high loading variables on the factors indicates both similarities and differences. The first factor for the Frankfort sample (F1) includes high loadings on the following variables: sandy, fun, enjoyable, colorful, appealing, outdoor-oriented, and interesting. Four of these variables are also found in the first factor for the Tawas sample (T1): fun, enjoyable, colorful, and interesting. In addition, two of the variables loading highly on Factor F1 not found on

Factor T1 are found together on Factor T6: sandy and appealing.

The second factor for the Frankfort sample (F2) includes seven high loading variables: secluded, peaceful, unspoiled, delightful, quiet, natural, and restful. Three of these variables load together on Factor T4 for the Tawas sample: quiet, natural, and restful. The remaining variables from Factor F2, however, do not load together on a factor for the Tawas sample; they are found on factors mixed in with other variables -- secluded on T7, peaceful on T3, and delightful on T2 (the remaining variable, unspoiled, did not load highly on any of the factors for the Tawas sample).

The third factor from the Frankfort sample (F3) was the only other factor to show similarity with the Tawas sample. Factor F3 included high loadings on the following variables: friendly, family-oriented, and courteous. Two of those variables are found loading highly together on Factor T2: friendly and courteous. However, two other variables: forested and delightful also loaded on Factor T2 -- adding some confusion to this dimension for this sample. The third variable from Factor F3, family-oriented, loaded on Factor T3 along with the variables pleasant and peaceful. These three variables are somewhat intuitively related to Factor F3, but are not supported by a comparison of the configuration of high loading variables.

No other factors between the two matrices included variables which loaded together consistently. Either variables which loaded together on a factor for one sample -- such as Factor F4 -- were split between factors for the other sample, or they appeared together on a factor for one sample and not at all for the other sample -- such as F7.

This comparison indicates that three of the eight dimensions show some degree of visual similarity across samples -- Factor F1 with Factors T1 and T6, Factor F2 with T4, and Factor F3 with T2. The next visual comparative aspect to be discussed is factor complexity.

Complexity. As discussed in the literature review, although implicitly involved in the configuration of the variables, the complexity of the variables which load on a set of factors or the complexity of the factors themselves, may be compared explicitly. This section examines both aspects of complexity. The first is the complexity of the variables -- on how many factors does a variable load highly. The second aspect considered in this section is the complexity of the factors. This measure of comparability looks to see what happens to a factor from one sample to another. Specifically, does a factor in one matrix split into two or more factors in another.

The criterion for comparing the complexity of the variables between matrices specifies that a variable with the same complexity on two factor matrices indicates stabi-

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lity for the factors involved with those variables. An operational indicator of a stable dimension between matrices, the other measure of complexity, is when a factor found in one matrix can be identified in one or more of the factors in the other matrix.

Regarding the complexity of the variables, for the Frankfort sample two of the twenty seven variables loaded highly on more than one factor. The variable delightful loaded on Factors F2 and F8; and variable restful loaded on Factors F2 and F6. For the Tawas sample only one variable loaded on more than one factor -- enjoyable; which loaded on Factors T1 and T5. All other variables loaded, if at all, on only one factor. Thus, with only a few exceptions the majority of the variables loaded on a single factor, and those which did load on more than one factor were not the same variables for the two samples.

For the complexity of the factors, one factor from the Frankfort sample which split between factors in the Tawas sample is Factor F1. This factor can be found in the Tawas matrix in Factors T1 and T6. Another factor from the Frankfort sample, F2, can be found, for the most part, in Factor T4, however, other variables in F2 are found in Factors T2, T3, and T7. In addition, Factor F3 from the Frankfort sample split between Factors T2 and T3 in Tawas sample. Both Factors T2 and T3, however, also have other variables which did not load highly in Factor F3 (Factor T3 has only one variable in common -- family-oriented -- with

Factor F3). This indicates that some "noise" is mixed in with this dimension for the Tawas sample.

Each sample had a specific factor -- one on which only a single variable loaded. However, the specific factor did not involve the same variables for the two matrices. The two factors were: for the Frankfort sample, F8 -- with the variable delightful -- and for the Tawas sample, T8 -- with the variable tourist-oriented.

In summary, an examination of the complexity of the variables involved with each factor matrix and the complexity of the factors between matrices provided only a slight increase in our understanding of the factor structure for the two samples. The analysis centering on the complexity of the factors lent more insight into the stability of factors, than did the analysis of the complexity of the individual variables. For the most part, the more positive results from this comparison affirmed the findings from the previous comparison involving the configuration of factor loadings.

<u>Communality of the Variables</u>. The final visual comparison conducted in the comparison across samples entails an examination of the communalities of the variables following factor rotation. The communality of a variable is a measure of the portion of a variable's variance which is accounted for by the factors extracted. Communalities are calculated by summing the squares of the factor loadings for a row (that is, for a given variable) in the factor

loadings matrix. A comparison of a variable's communality between studies -- in this case, between samples -- helps distinguish between those variables that are consistently interrelated and those that are consistently unique.

Communality comparisons are not frequently employed in factor comparison studies. The literature reviewed regarding this area of factor comparison only suggested that a variable's communality across two studies could be compared. No literature was found which provided any specific guidance regarding the criteria used to assess the stability of a variable's communality across studies.

To establish criteria for this section, each variable for the two samples was assigned to one of three categories depending on the ranking of the variable's communality relative to the other variables. The three categories were (1) the upper third (which contains the variables with the top 9 communalities), (2) the middle third (with the variables having the next 9 highest communalities), and (3) the lower third (the variables with the 9 lowest communalities). Stability is indicated when a variable remains in the same communality category (or third) for both samples. Those variables which remain in the top third between samples provide an indication of variables which are consistently intercorrelated with (and important to) the factor structure underlying the data.

Table 13 presents the communalities for each variable by subsample, and Table 14 shows the communality

category that each variable was classified into by subsample. Only four variables remained in the first category (the top third) between samples. The four variables are: enjoyable, pleasant, quiet, and restful. The variables consistently found in the second category (the middle third) between the

Table 13
Communalities By Subsample*

VARIABLE	COMMUNALITY FRANKFORT	COMMUNALITY TAWAS	ABSOLUTE DIFFERENCE IN PERCENT
accessible	55.9%	47.4%	8.5%
clean	33.8%	42.9%	9.1%
secluded	26.7%	28.0%	1.2%
expensive	40.1%	16.3%	23.8%
open	17.5%	64.8%	47.2%
forested	42.6%	46.6%	4.0%
friendly	29.8%	43.7%	14.0%
peaceful	33.0%	68.3%	35.4%
pleasant	49.1%	66.5%	17.4%
middle-class-oriented	52.3%	28.9%	23.4%
sandy	30.9%	78.7%	47.8%
fun	42.2%	47.9%	5.7%
family-oriented	32.1%	44.0%	11.9%
courteous	54.1%	46.5%	7.6%
enjoyable	69.6%	61.7%	7.9%
scenic	47.7%	26.9%	20.8%
unspoiled	45.8%	29.3%	16.5%
colorful	42.4%	47.8%	5.4%
appealing	48.7%	51.8%	3.1%
delightful	67.3%	38.0%	29.2%
outdoor-oriented	40.0%	19.7%	20.3%
interesting	52.4%	38.1%	14.3%
tourist-oriented	21.8%	53.7%	31.9%
quiet	51.6%	56.4%	4.8%
natural	46.0%	53.9%	7.9%
restful	64.2%	56.3%	7.8%
developed	30.0%	31.9%	1.9%

* Communalities reported are for the rotated matrices.

Table 14
Variables Classified into Communality Thirds
(Upper, Middle, and Lower) by Subsample

	FRANKFORT	TAWAS
UPPER THIRD	* enjoyable	sandy
	delightful	peaceful
	* restful	* pleasant
	accessible	open
	courteous	* enjoyable
	interesting	* quiet
	middle-class-oriented	* restful
	* quiet	natural
	* pleasant	tourist-oriented
MIDDLE THIRD	* appealing	* appealing
	scenic	* fun
	natural	* colorful
	unspoiled	accessible
	* forested	* forested
	* colorful	courteous
	* fun	family-oriented
	expensive	friendly
	outdoor-oriented	clean
LOWER THIRD	clean	interesting
	peaceful	delightful
	family-oriented	* developed
	sandy	unspoiled
	* developed	middle-class-oriented
	friendly	* secluded
	* secluded	scenic
	tourist-oriented	outdoor-oriented
	open	expensive

* Indicates variables remaining in the same third across samples.

two samples are: appealing, colorful, forested, and fun. And finally, the two variables which remained in the bottom or lowest third category in both samples are: developed and secluded.

All the variables which remained stable in the first two categories in this comparison were also among those found to indicate stability in the previous comparison involving the configuration of factor loadings. Although this is not surprising (since the communalities are computed from the same factor loadings), this finding provides additional information regarding the stability of the factor structure underlying destination images. The following discussion centers on the mathematical approaches used to assess factor similarity, vector comparisons.

Vector Comparisons

Generally, vector comparisons provide more objective measures of factor similarity than do the visual comparisons. These approaches compare the factors from one matrix with the factors from a second. The vector comparisons applied in this phase are: (1) Pearson's correlation coefficient (r), (2) root mean square (RMS), (3) coefficient of congruence (CC), and, (4), the salient variable similarity index (S-Index). In all cases the object of comparison used in calculating these measures was the factor loadings.

Pearson's Correlation Coefficient (r). Pearson's product moment correlation coefficient is a measure of pattern similarity between two vectors. The criterion pertinent to this measure of factor similarity, considers two factors from separate matrices similar (that is, picking up the same underlying dimension) if: (1) the two factors correlate above .40, and (2) that relationship is statistically significant (at the Prob $<$ .05 level).

Each of the eight factors from the Frankfort sample was paired with each of the eight factors from the Tawas sample. Pearson's correlation coefficient was then calculated for each factor pair. As seen in Table 15, several factors displayed significant relationships across the two samples. In particular, Factors F1 and T1, Factors F1 and T6, and Factors F2 and T4 all correlated significantly above the criterion of .40. Factors F3 and T2 also displayed a

Table 15
Factor Comparison Across Samples Using the Correlation (Pearson's r) of Factor Loadings

	T1	T2	T3	T4	T5	T6	T7	T8
F1	0.68	0.01	0.01	-0.10	0.09	0.47	-0.22	-0.15
	(.001)	(.977)	(.957)	(.622)	(.649)	(.014)	(.260)	(.462)
F2	0.09	0.22	0.28	0.75	-0.60	0.02	0.29	-0.24
	(.665)	(.274)	(.159)	(.001)	(.001)	(.924)	(.149)	(.228)
F3	0.28	0.39	0.19	0.08	0.12	-0.18	-0.35	0.09
	(.157)	(.044)	(.337)	(.706)	(.540)	(.357)	(.074)	(.644)
F4	-0.10	-0.12	0.36	0.23	0.02	0.20	-0.02	0.03
	(.158)	(.566)	(.064)	(.245)	(.902)	(.326)	(.941)	(.885)
F5	0.11	0.33	0.09	0.15	0.32	-0.10	0.08	-0.02
	(.569)	(.090)	(.657)	(.457)	(.105)	(.631)	(.680)	(.934)
F6	-0.02	0.31	-0.38	-0.34	-0.24	-0.03	0.00	0.21
	(.910)	(.110)	(.052)	(.079)	(.236)	(.879)	(.984)	(.286)
F7	-0.33	-0.50	-0.09	-0.51	0.29	0.12	0.14	0.14
	(.096)	(.008)	(.662)	(.006)	(.145)	(.568)	(.496)	(.474)
F8	0.20	0.06	-0.03	-0.16	-0.09	0.07	-0.31	-0.20
	(.308)	(.760)	(.877)	(.417)	(.662)	(.728)	(.121)	(.325)

Note: Factors F1 to F8 are from the Frankfort sample.
Factors T1 to T8 are from the Tawas sample.
Parentheses indicate significance level.

significant relationship, but correlated at .39, just slightly below the criterion of .40. Other notable correlations were obtained, but they were not at the .05 level of significance and several were inverse relationships.

This analysis indicated that the pattern of factor loadings for several of the factors was very similar. In fact, the factors found similar in this comparison were the same pairings identified in the comparison involving the configuration of factor loadings. Since this particular analysis is only sensitive to pattern similarities, other factor comparison measures were calculated to assess both pattern and magnitude similarities of the factors across the two samples.

Root Mean Square (RMS). The Root Mean Square or RMS provides the strictest measure of factor similarity since variations in both pattern and magnitude are detected. RMS ranges from zero (for a perfect pattern-magnitude match) to two (for a perfect inverse match). Intermediate values of RMS, however, are not readily interpretable. For the present study, RMS coefficients less than or equal to .10 provide a stringent measure of the match between a pair of factors.

RMS was calculated for all combinations of factor pairs across the two samples (Table 16). The coefficients were, in general, quite low -- ranging in value from a low of .14 to a high of .35. None, however, were low enough to

Table 16
Factor Comparison Across Samples Using the Root Mean Square (RMS) of Factor Loadings

	T1	T2	T3	T4	T5	T6	T7	T8
F1	0.17	0.28	0.28	0.29	0.27	0.22	0.31	0.31
F2	0.28	0.25	0.24	0.14	0.35	0.28	0.24	0.31
F3	0.23	0.20	0.23	0.24	0.24	0.27	0.29	0.25
F4	0.23	0.27	0.20	0.21	0.24	0.22	0.25	0.25
F5	0.28	0.23	0.26	0.25	0.21	0.27	0.24	0.24
F6	0.34	0.28	0.35	0.33	0.30	0.28	0.27	0.23
F7	0.35	0.34	0.30	0.33	0.22	0.24	0.24	0.22
F8	0.26	0.25	0.26	0.26	0.22	0.22	0.26	0.24

Note: Factors F1 to F8 are from the Frankfort sample.
Factors T1 to T8 are from the Tawas sample.

meet the established criterion of .10, although two factor-pairs did have coefficients under .20: F1 with T1 (.17) and F2 with T4 (.14). These two pairs of factors were among those found to be similar in the previous comparisons. The RMS coefficients for other notable factor pairs were:.22 for F1 and T6; and .20 for F3 and T2. Both of these factor pairs were also found to display a degree of similarity between samples in other comparisons, but did not meet the standard for this, more rigid, comparative measure.

Although the RMS coefficients calculated for the factor pairs found similar in the previous comparisons did not meet the established cutoff level, the coefficients for the factors involved in those pairs displayed the lowest (relative) coefficients of the factors involved in those pairings. For example, for Factor F2 the lowest RMS for the Tawas factors calculated with Factor F2, was for Factor T4. The same was true for Factor T4 -- the lowest of the eight coefficients calculated using T4 was for Factor F2.

A number of other factor pairs also displayed RMS coefficients under .25 which indicates that, in general, the magnitude of the factors is similar across the two samples. This is not at all surprising since the rotation imposed on the original factor matrices normally results in factors containing a large number of loadings near zero along with a small number of loadings of significant magnitude.

The large number of low coefficients, and the limited range of the RMS coefficient cast a shadow of doubt over the relative usefulness of this measure of factor similarity. Although none of the factor pairings met the criterion level, the pairings found similar in the previous factor comparison approaches performed relatively well. The following section expands the analysis by calculating a more lenient measure of factor similarity, the coefficient of congruence.

<u>Coefficient of Congruence (CC)</u>. The coefficient of congruence (or CC) also provides a measure of the match between a pair of factors in terms of magnitude and pattern similarity. The coefficient is more intuitively appealing because its interpretation is like that of the correlation

coefficient -- ranging from a value of 1.0 for a perfect pattern-magnitude match and -1.0 for a perfect inverse match. For the present analysis, a CC of .80 or greater was specified as the critical level for this comparative measure.

Table 17 presents the calculated CC's for each pair of factors across the two samples. Two factor pairs attained a CC of .80: Factors F1 and T1 (.85) and Factors F2 and T4 (.87). Once again, both of these pairs where found to be similar in the previous comparisons. Other pairings of factors displayed relatively high coefficients that were not at the .80 level. In particular, factor pairs F1 and T6

Table 17
Factor Comparison Across Samples Using the
Coefficient of Congruence (CC) of Factor Loadings

	T1	T2	T3	T4	T5	T6	T7	T8
F1	0.85	0.52	0.54	0.49	0.51	0.69	0.32	0.28
F2	0.52	0.58	0.62	0.87	0.06	0.42	0.56	0.17
F3	0.67	0.70	0.62	0.56	0.53	0.36	0.26	0.42
F4	0.64	0.42	0.68	0.61	0.45	0.53	0.40	0.35
F5	0.42	0.55	0.40	0.43	0.53	0.23	0.35	0.27
F6	0.01	0.26	-0.25	-0.23	-0.17	-0.01	0.02	0.21
F7	-0.06	-0.21	0.10	-0.21	0.37	0.23	0.24	0.23
F8	0.48	0.38	0.33	0.24	0.37	0.35	0.07	0.09

Note: Factors F1 to F8 are from the Frankfort sample.
Factors T1 to T8 are from the Tawas sample.

and F3 and T2 both achieved a CC of .70 -- both of which have also been shown to tap similar dimensions across the two samples in previous comparisons.

This analysis showed, once again, that certain dimensions underlying destination images retain a good degree of their identity across samples. This comparative measure, like the RMS, focused on the pattern-magnitude match between factors. The next and last method used to assess the similarity of factors across the two samples is the S-Index, the subject of the next major heading.

Salient Variable Similarity Index (S-Index). The final method used to assess the stability of factor structure across samples is the salient variable similarity index, or S-Index. The S-Index classifies the information from the factor loadings to one of three catagories: (1) loadings that are greater than .10 (positive salients -- PS); (2) loadings near zero -- between -.10 and .10 (hyperplane -- HY); and (3) loadings that are less than -.10 (negative salients -- NS). The S-Index is then calculated using these three categories to form a 3 by 3 table for a given pair of factors. The index ranges from 1.0 (when there is a perfect match) to -1.0 (when there is a perfect inverse relationship); a value of 0 indicates no similarity between the two factors.

Probability tables are available to determine the significance of the computed value of the S-Index. These tables are organized by: (1) the number of variables under investigation and (2) the percentage of loadings falling into the hyperplane category. Use of the probability tables, however, is reserved for those situations where (1) the percentage of variables falling into the hyperplane category is equivalent for the two factors being compared and (2) the percentage of hyperplane loadings (relative to the total number of loadings -- 27) across the two matrices is at least 60 percent.

For the present research, the criterion level indicating similarity of factor structure for the S-Index was set at .80. If possible, probability levels were to be determined for factor pairings meeting the requirements for use of the probability tables.

The S-Index values calculated for all factor pairings are presented in Table 18. A number of factor pairs not previously identified as similar displayed high S-Index values. This is not surprising since the possibility of calculating a high coefficient value by chance increases as the number of S-Index computations increases. This situation is also compounded by the fact that the S-Index reduces the original information from the factor loadings into three categories; a procedure which (for example) equates a loading of .70 with one of .12. Thus, the chance of calculating a relatively large S-Index value is high when the number of calculations made is high.

Nevertheless, two pairs of factors did attain the .80 level for this index of factor similarity. Factors F1

Table 18
Factor Comparison Across Samples Using the Salient Variable Similarity Index (S-Index) of Factor Loadings

	T1	T2	T3	T4	T5	T6	T7	T8
F1	0.88	0.70	0.65	0.72	0.41	0.57	0.58	0.44
F2	0.78	0.60	0.70	0.82	0.24	0.57	0.63	0.33
F3	0.75	0.46	0.67	0.58	0.55	0.41	0.38	0.51
F4	0.68	0.32	0.53	0.50	0.52	0.50	0.51	0.49
F5	0.61	0.44	0.62	0.52	0.46	0.44	0.33	0.43
F6	0.00	0.14	-0.31	0.00	-0.17	-0.17	0.15	0.16
F7	0.07	-0.21	0.15	0.07	0.44	0.17	0.30	0.16
F8	0.35	0.21	0.24	0.22	0.09	0.26	0.31	0.17

Note: Factors F1 to F8 are from the Frankfort sample.
Factors T1 to T8 are from the Tawas sample.

and T1 received a S-Index of .88, and Factors F2 and T4 had a S-Index of .82. Both of these factor pairs have been among those designated as similar in previous comparisons. The other factor pairs previously identified did not achieve an appreciable value for this measure (only .57 for Factors F1 and T6 and .46 for Factors F3 and T2).

None of the factor pairs determined to be similar in this comparison met the requirements for use of the probability tables. Either the percent of variables falling into the hyperplane category varied greatly for the two samples, or else the percent in the hyperplane category for the two samples did not meet the minimum of 60 percent necessary to make use of the tables.

The results of this particular comparison were parallel to those of the others. The S-Index provided another indication that certain factors do retain much of their identity from sample to sample. Although the S-Index was originally applied to provide a significance test for the match between a pair of factors, the use of the probability tables was not compatible with the data at hand.

Table 19 presents the results of the four vector comparison techniques across the eight factors for the Frankfort sample and the eight factors for the Tawas sample. In short, this analysis indicated that: two factor pairs consistently displayed congruence across the two samples (factor pairs F1 and T1, and F2 and T4); two pairs did so as well, but to a slightly lesser degree (F1 and T6, and F3 and T2); and the remaining pairs, displayed relatively no similarity at all. A discussion of the meaning and significance of these results will be deferred until the second research question is addressed -- the stability of the dimensions underlying regional images across target regions.

Table 19
Factor Comparison Across Samples Using the
the Correlation of Factor Loadings, RMS, CC, and
S-Index

FRANKFORT FACTOR	TAWAS FACTOR	CORRELATION OF FACTOR LOADINGS	RMS	CC	S-INDEX
1	1	0.68 ***	0.17	0.85	0.88
1	2	0.01	0.28	0.52	0.70
1	3	0.01	0.28	0.54	0.65
1	4	-0.10	0.29	0.49	0.72
1	5	0.09	0.27	0.51	0.41
1	6	0.47 *	0.22	0.69	0.57
1	7	-0.22	0.31	0.32	0.58
1	8	-0.15	0.31	0.28	0.44
2	1	0.09	0.28	0.52	0.78
2	2	0.22	0.25	0.58	0.60
2	3	0.28	0.24	0.62	0.70
2	4	0.75 ***	0.14	0.87	0.82
2	5	-0.60 ***	0.35	0.06	0.24
2	6	0.02	0.28	0.42	0.57
2	7	0.29	0.24	0.56	0.63
2	8	-0.24	0.31	0.17	0.33
3	1	0.28	0.23	0.67	0.75
3	2	0.39 *	0.20	0.70	0.46
3	3	0.09	0.23	0.62	0.67
3	4	0.08	0.24	0.56	0.58
3	5	0.12	0.24	0.53	0.55
3	6	-0.08	0.27	0.36	0.41
3	7	-0.35	0.29	0.26	0.38
3	8	0.09	0.25	0.42	0.51
4	1	0.28	0.23	0.64	0.68
4	2	-0.12	0.27	0.42	0.32
4	3	0.36	0.20	0.68	0.53
4	4	0.23	0.21	0.61	0.50
4	5	0.02	0.24	0.45	0.52
4	6	0.20	0.22	0.53	0.50
4	7	-0.02	0.25	0.40	0.51
4	8	0.03	0.25	0.35	0.49
5	1	0.11	0.28	0.42	0.61
5	2	0.33	0.23	0.55	0.44
5	3	0.09	0.26	0.40	0.62
5	4	0.15	0.25	0.43	0.52
5	5	0.31	0.21	0.53	0.46
5	6	-0.10	0.27	0.23	0.44
5	7	0.08	0.24	0.35	0.33
5	8	-0.02	0.24	0.27	0.43

Table 19 (Continued)

FRANKFORT FACTOR	TAWAS FACTOR	CORRELATION OF FACTOR LOADINGS		RMS	CC	S-INDEX
6	1	-0.02		0.34	0.01	0.00
6	2	0.31		0.28	0.26	0.14
6	3	-0.38		0.35	-0.25	-0.31
6	4	-0.34		0.33	-0.23	0.00
6	5	-0.24		0.30	-0.17	-0.17
6	6	-0.03		0.28	-0.01	-0.17
6	7	0.00		0.27	0.02	0.15
6	8	0.21		0.23	0.21	0.16
7	1	-0.33		0.35	-0.06	0.07
7	2	-0.50	**	0.34	-0.21	-0.21
7	3	-0.09		0.30	0.10	0.15
7	4	-0.51	**	0.33	-0.21	0.07
7	5	0.29		0.22	0.37	0.44
7	6	0.12		0.24	0.23	0.17
7	7	0.14		0.24	0.24	0.30
7	8	0.14		0.22	0.23	0.16
8	1	0.20		0.26	0.48	0.35
8	2	0.06		0.25	0.38	0.21
8	3	-0.03		0.26	0.33	0.24
8	4	-0.16		0.26	0.24	0.22
8	5	0.09		0.22	0.37	0.09
8	6	0.07		0.22	0.35	0.26
8	7	-0.31		0.26	0.07	0.31
8	8	-0.20		0.24	0.09	0.17

*** Prob < .001
** Prob < .01
* Prob < .05

Comparison Across Regions

The previous section examined the stability of the dimensions underlying tourists' images of a specific tourism region across two different groups of respondents. The goal of that analysis was to address the following question: Are the dimensions used to describe tourism regions generalizable to different samples, or, are they sample specific. This section shifts the analysis to investigate whether any of the dimensions underlying respondent images of tourism destinations remain stable across different target regions, this time, for the same sample. The research question underpinning this comparison was designed to determine whether tourists use similar criteria to subjectively evaluate different tourism destinations.

The research design involved in this comparison called for the same subjects and different sets of variables. The same 27 variables used in the previous comparison across samples were used for this analysis. In this case, however, two groups of the 27 adjectives were used -- one of which represented respondents' image of Side "A" (the Lake Michigan coast) and one which represented respondents' image of Side "B" (the Lake Huron coast). The following section discusses the creation of the sample used for this portion of the analysis. The remaining sections generally parallel those in the previous comparison, including discussions of: the number of factors retained for rotation, visual comparisons, and, finally, vector comparisons.

The Sample

A single group of respondents was required for this comparison. As before, that group had to be as homogeneous and large as possible. Therefore only respondents who completed both adjective checklist's (ACL's) -- one for Side "A" and one for Side "B" -- were considered for inclusion.

Only three respondents did not complete either ACL, whereas most completed at least one (Table 20). The number of respondents who completed both ACL's is 188. Roughly 65 percent of these respondents were surveyed in Tawas, the remaining 35 percent were surveyed in Frankfort. This combined group of respondents represents the sample used for this comparison. Prior to comparing the factor structure of the two target regions for the combined sample, it is necessary to discuss the preliminary issue of the number of factors extracted for rotation.

Table 20
Number of Adjective Checklists (ACL's) Completed by Subsample*

SUBSAMPLE	BOTH ACL'S	AT LEAST ONE ACL	NO ACL'S
Frankfort	66 (35.1)	135 (47.5)	1 (33.3)
Tawas	122 (64.9)	149 (52.5)	2 (66.6)
Combined	188 (100.0)	284 (100.0)	3 (100.0)

*Numbers in parentheses indicate the percentage.

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The Number of Factors Retained For Rotation

The two sets of twenty seven adjectives (one for Side "A" and one for Side "B") were then factor analyzed for the combined sample to identify the dimensions underlying respondent images of the two target regions. For the most part, the unrotated factor matrices indicated similar patterns of interrelationships in the data (Table 21). As before, the decision to make at this stage was to determine the number of factors to extract for rotation for the two target regions. The same methods employed in the comparison across samples were considered: the number of factors with eigenvalues greater than one, the percent of total variance explained by each factor, scree tests, and interpretability.

The Number of Factors with Eigenvalues Greater Than One. Side "A" had eight factors and Side "B" had seven factors with eigenvalues greater than unity (Table 21). At eight factors for Side "A" 60.5 percent of the total variation in the data was explained; at seven factors for Side "B" 54.1 percent was explained.

Percent of Variance Explained. Once again, this criterion suggests that only factors accounting for at least five percent of the total variance in the data should be retained for rotation. In the present comparison, the first four factors for each region account for at least five percent of the total variance in the data. Beyond four factors the percent of total variation in each factor steadily decreases.

Table 21
Eigenvalues and Percent of Total Variance Explained*
Before Factor Rotation by Region

FACTOR	EIGENVALUES SIDE "A"	EIGENVALUES SIDE "B"	PERCENT OF TOTAL VARIANCE EXPLAINED SIDE "A"	PERCENT OF TOTAL VARIANCE EXPLAINED SIDE "B"	CUMULATIVE PERCENT OF TOTAL VARIANCE EXPLAINED SIDE "A"	CUMULATIVE PERCENT OF TOTAL VARIANCE EXPLAINED SIDE "B"
1	7.284	6.301	27.0%	23.3%	27.0%	23.3%
2	1.776	1.936	6.6%	7.2%	33.6%	30.5%
3	1.548	1.470	5.7%	5.4%	39.3%	36.0%
4	1.341	1.409	5.0%	5.2%	44.3%	41.2%
5	1.230	1.272	4.6%	4.7%	48.8%	45.9%
6	1.075	1.201	4.0%	4.4%	52.8%	50.3%
7	1.055	1.017	3.9%	3.8%	56.7%	54.1%
8	1.016	0.981	3.8%	3.6%	60.5%	57.7%
9	0.907	0.971	3.4%	3.6%	63.8%	61.3%
10	0.874	0.898	3.2%	3.3%	67.1%	64.6%
11	0.760	0.869	2.8%	3.2%	69.9%	67.9%
12	0.754	0.833	2.8%	3.1%	72.7%	71.0%
13	0.749	0.741	2.8%	2.7%	75.4%	73.7%
14	0.675	0.728	2.5%	2.7%	77.9%	76.4%
15	0.636	0.664	2.4%	2.5%	80.3%	78.9%
16	0.611	0.637	2.3%	2.4%	82.6%	81.2%
17	0.604	0.609	2.2%	2.3%	84.8%	83.5%
18	0.544	0.560	2.0%	2.1%	86.8%	85.5%
19	0.506	0.546	1.9%	2.0%	88.7%	87.6%
20	0.484	0.532	1.8%	2.0%	90.5%	89.5%
21	0.450	0.500	1.7%	1.9%	92.1%	91.4%
22	0.437	0.489	1.6%	1.8%	93.8%	93.2%
23	0.416	0.480	1.5%	1.8%	95.3%	95.0%
24	0.374	0.397	1.4%	1.5%	96.7%	96.4%
25	0.347	0.376	1.3%	1.4%	98.0%	97.8%
26	0.297	0.320	1.1%	1.2%	99.1%	99.0%
27	0.251	0.263	0.9%	1.0%	100.0%	100.0%

* Based on principal axis factoring.

Scree Test. The scree tests for the two target regions are presented in Figures 3 and 4. As in the comparison across samples, the two plots indicate a very similar pattern. Once again, however, they fail to provide

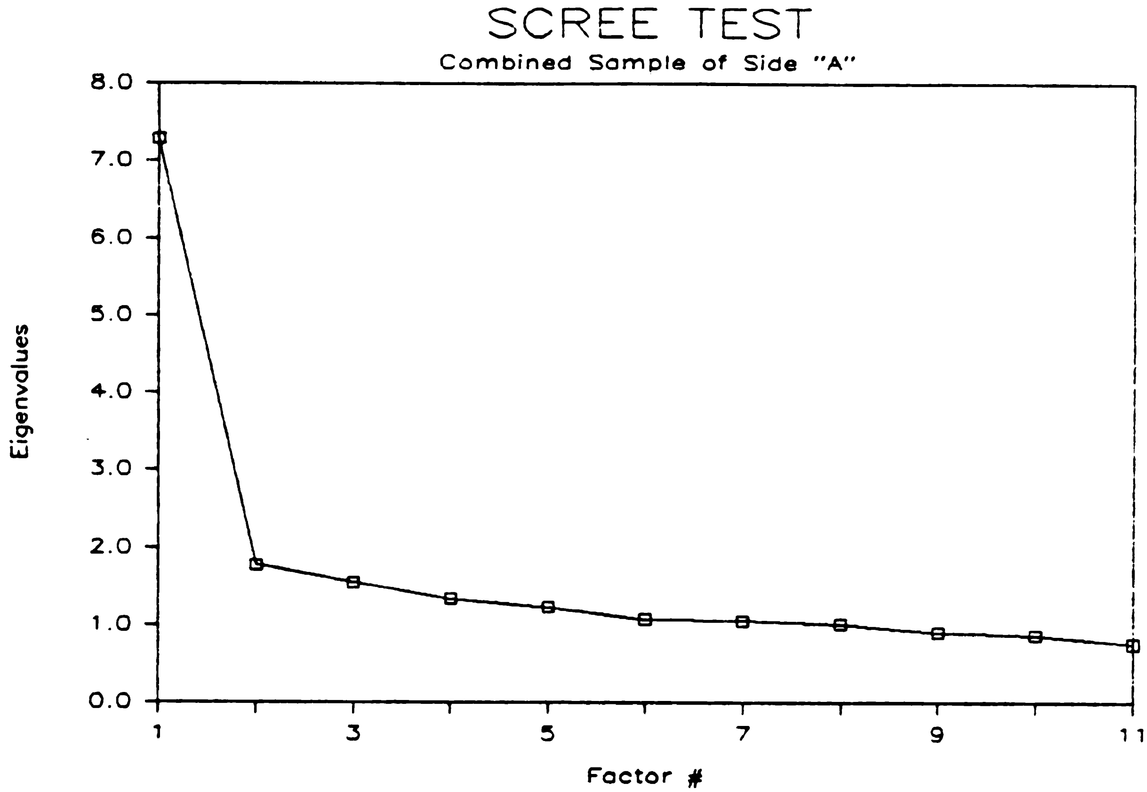

Figure 3 -- Scree Test for Combined Sample of Side "A"

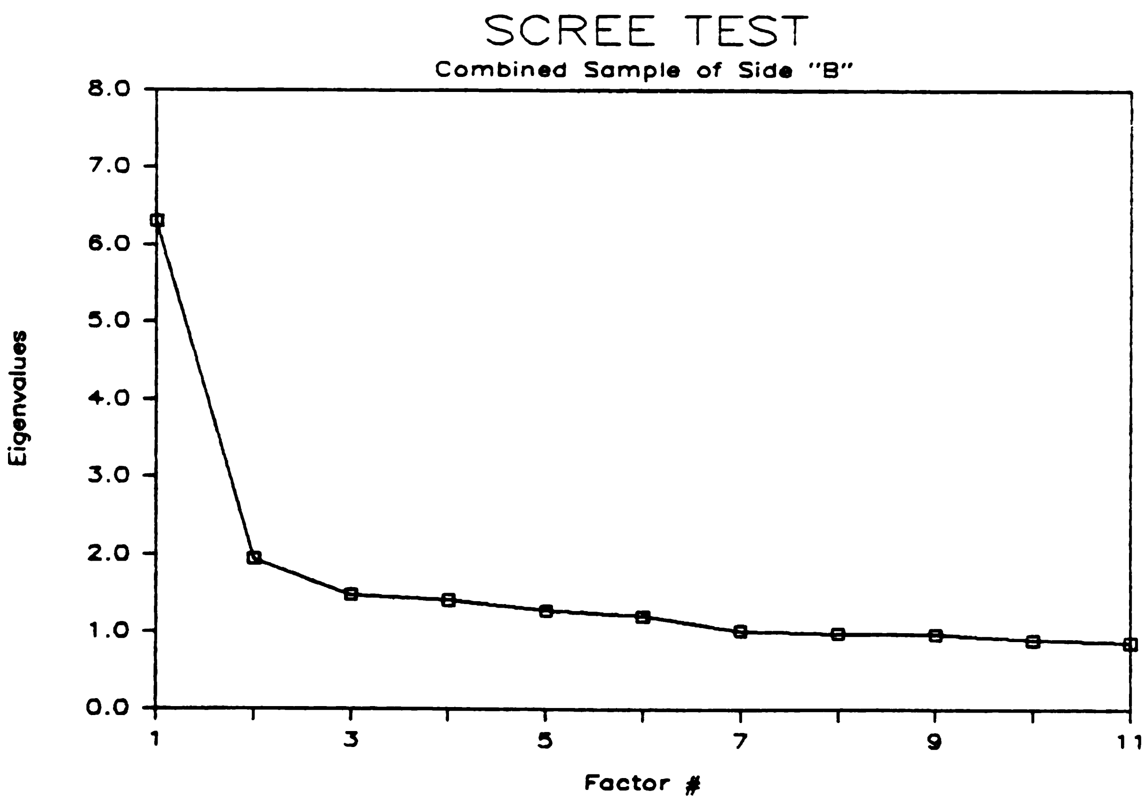

Figure 4 -- Scree Test for Combined Sample of Side "B"

any clear indication as to where the point of discontinuity begins and, thus, where the cutoff for the number of factors to retain for rotation begins.

Interpretability. The final method applied to the number of factors issue for this comparison was interpretability. As before, both sets of data were factor analyzed and rotated (according to the varimax criteria), this time specifying seven and eight factors. Once again, the eight factor solution did not improve the interpretation of the results over the seven factor solution.

The four methods applied to determine the number of factors to retain for rotation indicated a range between four and eight factors. At four factors, however, only 44.3 and 41.2 percent of the total variation in the data is explained for Side "A" and Side "B" respectively. At eight factors a greater percentage of the total variation in the data is explained, but the eigenvalue for Side "B" is .981, which is below the cutoff of one. In addition, the interpretation of the rotated matrices does not improve significantly for the eight factor solution versus the seven factor solution. These results led to the decision to retain seven factors for each target region for rotation and subsequent rotation.

Visual Comparisons

The visual comparisons applied in this section are identical to those made in the comparison across samples. They include: (1) the number of factors with eigenvalues greater than one, (2) the percent of toal variance explained, (3) the configuration of factor loadings, (4) the complexity of the factor structure, and (5) the communalities of the variables.

The Number of Factors with Eigenvalues Greater Than One. As displayed in Table 21, the number of factors with eigenvalues greater than one before factor rotation is eight for Side "A" and seven for Side "B". This difference indicates slightly greater cohesion in the factor structure of for the Side "B" data. This finding can be expected since the majority of the combined sample used in this comparison was surveyed in Tawas -- which is located on Side "B" -- and thus, is more likely to have a better formed image of that region. Nevertheless, the number of factors with eigenvalues greater than one is within one for the two target regions, indicating a comparable factor structure between the two matrices.

Percent of Variance Explained. As in the comparison across samples, this comparison also considers the percent of variance explained by each unrotated factor, and the percent of total variance explained by the factors retained for rotation for the two matrices. As before, the factor to factor comparison will be presented first followed by the matrix to matrix comparison.

When comparing factor to factor, with the exception of the first factor, the pattern of the percent of total variance explained for each pair of factors (in the unrotated factor matrix) is notably similar (Table 21). For the first factor the percent of variance explained is 27.0 percent for Side "A" and 23.3 percent for Side "B". The difference between the two, 3.7 percent, is greater than the 2 percent suggested as the criterion for this measure of factor similarity. However, the maximum difference for the remaining factors between the two sets of data does not exceed .6 of a percent. Thus, with the exception of the first factor, the percent of variance accounted for by each factor is similar across the two target regions.

For the matrix to matrix comparison, at the cutoff point for the number of factors retained for rotation (seven factors), the percent of total variance explained for Side "A" was 56.7 percent; for Side "B" it was 54.1 percent. The difference between the two, then, is 2.6 percent, which is within the criterion of 5 percent. This again indicates that the factor structure underlying the data for each target region is comparable.

<u>Configuration of the Loadings</u>. The varimax rotated factor matrix for the adjectives used to describe Side "A" is presented in Table 22. Likewise, Table 23 gives the rotated matrix for the adjectives used to describe

Table 22
Varimax Rotated Factor Matrix For Combined Sample of Side "A" (N = 188)

VARIABLE	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6	FACTOR 7	COMMUNALITY
accessible	0.24637	-0.01712	0.03197	-0.02354	0.61758	0.10267	0.05676	45.8%
clean	0.25751	0.17618	0.27376	0.27463	0.29925	0.05673	0.11059	35.3%
secluded	0.04220	0.39597	0.01240	0.09348	-0.05552	0.06178	0.04119	17.6%
expensive	-0.20085	-0.08017	-0.15167	-0.11830	-0.04345	0.06736	-0.67255	54.3%
open	0.01655	0.16403	0.07709	0.31177	-0.01438	0.09515	0.06531	14.4%
forested	0.41052	0.17079	0.13092	-0.02844	0.07959	0.28130	0.23774	35.8%
friendly	0.57523	0.10424	0.13962	0.14907	0.03730	-0.01396	0.06085	38.9%
peaceful	0.38431	0.45592	-0.02461	0.44499	-0.02146	-0.08588	0.05951	56.6%
pleasant	0.23562	0.30724	0.13773	0.50668	0.03447	0.00259	-0.01467	42.7%
middle-class-oriented	0.46143	0.17414	0.10741	-0.00948	0.12517	0.17133	0.11156	31.2%
sandy	0.05934	0.13185	0.26929	0.48474	0.18473	0.21187	-0.01163	40.8%
fun	0.25728	0.00940	0.40274	0.37105	0.04645	0.00179	0.00646	36.8%
family-oriented	0.59962	0.14457	0.07764	0.22346	0.12683	0.14509	0.04040	47.5%
courteous	0.53845	0.14520	0.25898	0.16079	0.24476	-0.04554	0.09207	47.4%
enjoyable	0.13001	0.04814	0.38268	0.39521	0.49929	0.02052	0.06745	57.6%
scenic	0.07216	0.19409	0.28337	0.19517	0.26166	0.30862	0.12905	34.2%
unspoiled	0.19844	0.40800	0.32969	0.07858	-0.02875	0.19014	0.10269	36.8%
colorful	0.04876	0.06312	0.60779	0.33046	0.02741	0.08830	0.10244	50.4%
appealing	0.19993	0.17273	0.25910	0.47855	0.36386	-0.05846	0.06625	50.6%
delightful	0.44307	0.28687	0.47739	0.12569	0.05396	0.10245	-0.22898	58.8%
outdoor-oriented	0.27373	0.23002	0.02797	0.24732	0.10027	0.20455	0.10101	25.2%
interesting	0.21834	0.15231	0.57533	0.04650	0.13610	-0.00214	0.15186	44.6%
tourist-oriented	0.13612	0.00269	0.04346	0.05655	0.06996	0.53881	-0.05868	32.2%
quiet	0.19950	0.71679	0.10515	0.13971	0.14021	-0.06098	-0.06430	61.2%
natural	0.27014	0.49548	0.33398	0.20490	-0.03566	0.11337	0.21106	53.1%
restful	0.24232	0.56257	0.21492	0.34851	0.14897	-0.16685	0.09837	60.3%
developed	-0.03421	-0.08970	-0.02929	0.08295	0.30376	0.25366	-0.18288	20.7%

Table 23
Varimax Rotated Factor Matrix For Combined Sample of Side "B" (N = 188)

VARIABLE	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6	FACTOR 7	COMMUNALITY
accessible	0.00228	0.17105	-0.04892	0.43134	0.00211	-0.02880	0.10043	22.9%
clean	0.30050	0.32946	0.26902	0.23325	0.14279	0.06963	-0.06519	35.5%
secluded	0.42755	-0.00292	-0.08430	-0.11616	-0.06377	0.20907	0.16883	28.0%
expensive	-0.02350	-0.02093	0.04631	0.04203	0.89629	-0.00249	0.09931	81.8%
open	0.45554	0.02560	0.22077	0.10279	-0.10666	-0.04732	0.11142	29.4%
forested	0.06677	0.10756	0.08520	0.16781	0.01095	0.70446	0.12434	56.3%
friendly	0.15675	0.15953	0.25225	0.52993	0.15780	0.02609	-0.22534	47.1%
peaceful	0.47513	0.09675	0.21792	0.14432	0.09773	-0.03076	-0.06392	31.8%
pleasant	0.41508	0.14308	0.23218	0.23639	0.04919	-0.06095	-0.06073	31.2%
middle-class-oriented	0.00890	0.09505	-0.04033	0.51645	-0.06117	0.14167	0.19274	33.8%
sandy	0.11651	0.13914	0.48057	0.03699	-0.01107	-0.09381	0.11438	28.7%
fun	0.16571	0.43754	0.43613	0.18750	0.01107	-0.02328	-0.04049	44.7%
family-oriented	0.05198	0.46651	0.14781	0.24701	-0.08321	0.09520	0.07425	32.5%
courteous	0.19043	0.04706	0.26036	0.54408	0.08269	0.09077	0.03388	41.9%
enjoyable	0.26960	0.50134	0.08184	0.17775	0.12794	-0.14565	-0.09413	40.9%
scenic	0.06362	0.24222	0.33750	0.10119	0.05755	0.11234	-0.02944	20.4%
unspoiled	0.47597	0.27664	0.13189	-0.04189	0.05549	0.15032	-0.00795	34.8%
colorful	0.20647	0.05053	0.59795	-0.03840	0.03598	0.15967	-0.09700	44.0%
appealing	0.33178	0.36138	0.27335	0.17626	-0.00964	-0.03276	0.13816	36.7%
delightful	0.27701	0.23440	0.52435	0.06939	0.01270	0.01813	0.05069	41.4%
outdoor-oriented	0.26823	0.51984	0.20962	0.03758	-0.13630	0.14770	-0.10432	43.9%
interesting	0.28284	0.40469	0.18765	0.09760	0.08646	0.14743	-0.08747	32.5%
tourist-oriented	0.01944	0.09720	0.28379	0.18530	0.21901	0.11837	0.28619	26.9%
quiet	0.77037	0.17886	0.10318	0.02650	-0.03536	-0.04058	-0.03726	64.1%
natural	0.53180	0.31754	0.15233	0.08711	0.11879	0.23960	-0.27264	56.0%
restful	0.51018	0.30982	0.18905	0.13944	-0.02601	0.03468	-0.00253	41.3%
developed	0.01120	-0.08938	0.02763	0.13376	0.06989	0.08306	0.59940	39.8%

Table 24
Varimax Rotated Factor Matrix For Combined Sample of Both Sides "A" & "B"

VARIABLE	FACTOR 1		FACTOR 2		FACTOR 3		FACTOR 4		FACTOR 5		FACTOR 6		FACTOR 7	
	A1	B1	A2	B2	A3	B3	A4	B4	A5	B5	A6	B6	A7	B7
accessible	0.25	0.00	-0.02	0.17	0.03	-0.05	-0.02	(0.43)	(0.62)	0.00	0.10	-0.03	0.06	0.10
clean	0.26	0.30	0.18	0.33	0.27	0.27	0.27	0.23	0.30	0.14	0.06	0.07	0.11	-0.07
secluded	0.04	(0.43)	(0.40)	-0.00	0.01	-0.08	0.09	-0.12	-0.06	-0.06	0.06	0.21	0.04	0.17
expensive	-0.20	-0.02	-0.08	-0.02	-0.15	0.05	-0.12	0.04	-0.04	(0.90)	0.07	-0.00	(-0.67)	0.10
open	0.02	(0.46)	0.16	0.03	0.08	0.22	0.31	0.10	-0.01	-0.11	0.10	-0.05	0.07	0.11
forested	(0.41)	0.07	0.17	0.11	0.13	0.09	-0.03	0.17	0.08	0.01	0.28	(0.70)	0.24	0.12
friendly	(0.58)	0.16	0.10	0.16	0.14	0.25	0.15	(0.53)	0.04	0.16	-0.01	0.03	0.06	-0.23
peaceful	(0.38)	(0.48)	(0.46)	0.10	-0.02	0.22	(0.44)	0.14	-0.02	0.10	-0.09	-0.03	0.06	-0.06
pleasant	0.24	(0.42)	0.31	0.14	0.14	0.23	(0.51)	0.24	0.03	0.05	0.00	-0.06	-0.01	-0.06
middle-class-oriented	(0.46)	0.01	0.17	0.10	0.11	-0.04	-0.01	(0.52)	0.13	-0.06	0.17	0.14	0.11	0.19
sandy	0.06	0.12	0.13	0.14	0.27	(0.48)	(0.48)	0.04	0.18	-0.01	0.21	-0.09	-0.01	0.11
fun	0.26	0.17	0.01	(0.44)	(0.40)	(0.44)	0.37	0.19	0.05	0.01	0.00	-0.02	0.01	-0.04
family-oriented	(0.60)	0.05	0.14	(0.47)	0.08	0.15	0.22	0.25	0.13	-0.08	0.15	0.10	0.04	0.07
courteous	(0.54)	0.19	0.15	0.05	0.26	0.26	0.16	(0.54)	0.24	0.08	-0.05	0.09	0.09	0.03
enjoyable	0.13	0.27	0.05	(0.50)	(0.38)	0.08	(0.40)	0.18	(0.50)	0.13	0.02	-0.15	0.07	-0.09
scenic	0.07	0.06	0.19	0.24	0.28	0.34	0.20	0.10	0.26	0.06	0.31	0.11	0.13	-0.03
unspoiled	0.20	(0.48)	(0.41)	0.28	0.33	0.13	0.08	-0.04	-0.03	0.06	0.19	0.15	0.10	-0.01
colorful	0.05	0.21	0.06	0.05	(0.61)	(0.60)	0.33	-0.04	0.03	0.04	0.09	0.16	0.10	-0.10
appealing	0.20	0.33	0.17	0.36	0.26	0.27	(0.48)	0.18	0.36	-0.01	-0.06	-0.03	0.07	0.14
delightful	(0.44)	0.28	0.29	0.23	(0.48)	(0.52)	0.13	0.07	0.05	0.01	0.10	0.02	-0.23	0.05
outdoor-oriented	0.27	0.27	0.23	(0.52)	0.03	0.21	0.25	0.04	0.10	-0.14	0.20	0.15	0.10	-0.10
interesting	0.22	0.28	0.15	(0.40)	(0.58)	0.19	0.05	0.10	0.14	0.09	-0.00	0.15	0.15	-0.09
tourist-oriented	0.14	0.02	0.00	0.10	0.04	0.28	0.06	0.19	0.07	0.22	(0.54)	0.12	-0.06	0.29
quiet	0.20	(0.77)	(0.72)	0.18	0.11	0.10	0.14	0.03	0.14	-0.04	-0.06	-0.04	-0.06	-0.04
natural	0.27	(0.55)	(0.50)	0.32	0.33	0.15	0.20	0.09	-0.04	0.12	0.11	0.24	0.21	-0.27
restful	0.24	(0.51)	(0.56)	0.31	0.21	0.19	0.35	0.14	0.15	-0.03	-0.17	0.03	0.10	-0.00
developed	-0.03	0.01	-0.09	-0.09	-0.03	0.03	0.08	0.13	0.30	0.07	0.25	0.08	-0.18	(0.60)

Note: Parentheses indicate variables loading greater than +/-0.38 on a factor.

Side "B". The two matrices are also presented together, factor by factor, in Table 24. In that table, factors for the adjectives describing Side "A" are labeled A1 to A7, and the factors for the adjectives describing Side "B" are labeled B1 to B7.

As in the previous comparison, a stable factor is one on which (at least) two variables load highly (above .38) together on that factor across matrices. The configuration of each factor matrix will be presented first, followed by a discussion of the similarities and differences between the two.

As seen in Tables 25 and 26, the first factor for the factor matrix summarizing respondents' images of Side "A" (Factor A1) contained the following high loading variables: forested, friendly, peaceful, middle-class-oriented, family-oriented, courteous, and delightful. Factor 2 for the Side "A" matrix (A2) included six high loading variables: secluded, peaceful, unspoiled, quiet, natural, and restful. Factor A3 had high loadings on these adjectives: fun, enjoyable, colorful, delightful, and interesting. The fourth factor for this matrix (Factor A4) loaded with the following variables: peaceful, pleasant, sandy, enjoyable, and appealing. Factor A5 loaded two variables: accessible and enjoyable. Finally, the last two factors for this matrix each loaded a single variable. The variable tourist-oriented loaded on Factor A6; and the variable expensive loaded on Factor A7 (with a negative loading).

Table 25
Configuration of the Highest Loading Variables for Combined Sample of Side "A" (N = 188)

VARIABLE	A1	A2	A3	A4	A5	A6	A7
accessible					0.62		
clean							
secluded		0.40					
expensive							-0.67
open							
forested	0.41						
friendly	0.58						
peaceful	0.38	0.46		0.44			
pleasant				0.51			
middle-class-oriented	0.46						
sandy				0.48			
fun			0.40				
family-oriented	0.60						
courteous	0.54						
enjoyable			0.38	0.40	0.50		
scenic							
unspoiled		0.41					
colorful			0.61				
appealing				0.48			
delightful	0.44		0.48				
outdoor-oriented							
interesting			0.58				
tourist-oriented						0.54	
quiet		0.72					
natural		0.50					
restful		0.56					
developed							

Table 26
Highest Loading Variables Ranked by Factor
for the Combined Sample of Side "A" (N = 188)

VARIABLE	A1	A2	A3	A4	A5	A6	A7
family-oriented	0.60						
friendly	0.58						
courteous	0.54						
middle-class-oriented	0.46						
delightful	0.44						
forested	0.41						
peaceful	0.38						
quiet		0.72					
restful		0.56					
natural		0.50					
peaceful		0.46					
unspoiled		0.41					
secluded		0.40					
colorful			0.61				
interesting			0.58				
delightful			0.48				
fun			0.40				
enjoyable			0.38				
pleasant				0.51			
sandy				0.48			
appealing				0.48			
peaceful				0.44			
enjoyable				0.40			
accessible					0.62		
enjoyable					0.50		
tourist-oriented						0.54	
expensive							-0.67

The variables loading on the first factor for Side "B" (B1) (see Tables 27 and 28) were: secluded, open, peaceful, pleasant, unspoiled, quiet, natural, and restful. Factor B2 included high loadings on the following: fun, family-oriented, enjoyable, outdoor-oriented, and interesting. The third factor (B3) loaded highly on four variables: sandy, fun, colorful, and delightful. Factor B4

Table 27
Configuration of the Highest Loading Variables for Combined Sample of Side "B" (N = 188)

VARIABLE	B1	B2	B3	B4	B5	B6	B7
accessible				0.43			
clean							
secluded	0.43						
expensive					0.90		
open	0.46						
forested						0.70	
friendly				0.53			
peaceful	0.48						
pleasant	0.42						
middle-class-oriented				0.52			
sandy			0.48				
fun		0.44	0.44				
family-oriented		0.47					
courteous				0.54			
enjoyable		0.50					
scenic							
unspoiled	0.48						
colorful			0.60				
appealing							
delightful			0.52				
outdoor-oriented		0.52					
interesting		0.40					
tourist-oriented							
quiet	0.77						
natural	0.53						
restful	0.51						
developed							0.60

loaded the following: accessible, friendly, middle-class-oriented, and courteous. The remaining three factors for this matrix each contained only one high loading variable. The variable expensive loaded on Factor B5; forested loaded on B6; and developed loaded on Factor B7.

A comparison of the configuration of the high loading variables on the factors shows some similarity between the two matrices. The first factor for target

Table 28
Highest Loading Variables Ranked by Factor
for the Combined Sample of Side "B" (N = 188)

VARIABLE	B1	B2	B3	B4	B5	B6	B7
quiet	0.77						
natural	0.53						
restful	0.51						
unspoiled	0.48						
peaceful	0.48						
open	0.46						
secluded	0.43						
pleasant	0.42						
outdoor-oriented		0.52					
enjoyable		0.50					
family-oriented		0.47					
fun		0.44					
interesting		0.40					
colorful			0.60				
delightful			0.52				
sandy			0.48				
fun			0.44				
courteous				0.54			
friendly				0.53			
middle-class-oriented				0.52			
accessible				0.43			
expensive					0.90		
forested						0.70	
developed							0.60

region "A" (A1) contained high loadings on the following variables: forested, friendly, peaceful, middle-class-oriented, family-oriented, courteous, and delightful. Three of these variables are also found for Side "B" on Factor B4: friendly, middle-class-oriented, and courteous. None of the other four variables on Factor A1 are found together on a factor for target region "B".

The second factor for Side "A" (A2) included six high loading variables: secluded, peaceful, unspoiled, quiet, natural, and restful. All six of these variables were also found together on Factor (B1) indicating a high level of convergence for this dimension. Two variables which also loaded on Factor B1 include: open, and pleasant. The adjective open is not found on the factor loadings matrix for Side "A", however, the adjective pleasant is. Pleasant loads on Factor A4 along with four other variables: sandy, appealing, peaceful (which was already found on Factor A2), and enjoyable. Thus, of the variables found on B1, six are found together on A2 and two are found together on A4 (though the two varibles on A4 also load with other variables not found on Factor B1).

Factor 3 for Side "A" (A3) included the following adjectives: fun, enjoyable, colorful, delightful, and interesting. These same adjectives appear on the matrix for Side "B" in Factors B2 and B3. Of these six adjectives, three were found on Factor B2: fun, enjoyable, and interesting; and three were found on B3: fun, colorful, and delightful (note that the adjective fun loaded on two factors for Side "B" -- B2 and B3).

The remaining factors did not involve results which were comparable between the matrices for the two target regions. To recap, the following factors for target region "A", were found to be similar with the following factors for target region "B": Factor A1 with B4; Factor A2 and B1; Factor A3 with Factors B2 and B3; and Factor A4 with Factor B1. The results indicate that there is some degree of similarity in the factor structure for the two target regions. The next aspect of factor comparison considered is factor complexity.

<u>Complexity</u>. As before, this analysis considers both aspects of complexity -- the complexity of the variables on the factors between studies and the complexity of the factors themselves between the two studies. The same criteria used in the comparison across samples are sought for this comparison: (1) for the complexity of the variables, look for a variable loading highly on the same number of factors between studies, and, (2) for the complexity of the factors, look to see whether a factor found in one study can be clearly identified in one or more factors in another study. That is, did a dimension which was found in a single factor on one matrix remain as a single factor, or was it split between two or more factors, on the second matrix.

Regarding the complexity of the variables, for the adjectives used to describing Side "A", three loaded on more than one factor in the Side "A" matrix (Table 25): peaceful, enjoyable, and delightful. The adjective peaceful loaded on three factors: A1, A2, and A4. The adjective enjoyable also loaded on three factors: A3, A4, and A5. Finally, the adjective delightful loaded on two factors: A1 and A3. The adjectives involved on the factors for Side "B" did not display the same level of complexity as the Side "A" adjectives. For the Side "B" matrix, only one adjective loaded on more than one factor: fun -- which was found on Factors B2 and B3. In short, the adjectives involved in the factor analysis for Side "B" were less complex than those involved in the factor analysis for Side "A". This may mean that respondents' had a more concise image -- and thus, a clearer simple structure -- of Side "B" than they did of Side "A".

In the comparison of the complexity of the factors, of the factors found to be similar between the two matrices, only Factors A1 and B4 remained as one relatively identifiable factor for both matrices. Otherwise, one factor from each matrix appeared as two factors on the other matrix. For Side "A", Factor A3 was found split between two factors (B2 and B3) in the Side "B" matrix. For the Side "B" factor matrix, Factor B1 was found in Factors A2 and A4 for the Side "A" matrix. Thus, for this comparison, of the dimensions which appear stable, only one factor remained as as a single factor across matrices. The others appeared in more than one factor on the second matrix.

In summary, the comparison of the complexity of the variables between the factor matrices for the two target regions did not provide any substantive support regarding the stability of factor structure across regions. In fact, it demonstrated that the variables on the Side "B" matrix were more often alligned with a single factor than were the variables for the Side "A" matrix. The comparison involving the complexity of the factors, on the other hand, did indicate stability for several factors which retained their identity in one or more factors across the two matrices. The next portion of this analysis considers the communalities of the variables as the object of comparison between the two factor matrices.

Communality of the Variables. This comparison, involving the communalities of the variables, looks to see whether a variable remains in the same communality category (or third) across studies. Once again, of particular interest are those variables which remain in the upper communality third in both factor matrices.

The communalities for each region are presented in Table 29, while Table 30 shows the communality category that each variable was assigned to, for each region. Four variables were found in the upper communality third for both regions: expensive, colorful, quiet, and natural. For the middle category, two variables remained stable: unspoiled and interesting. Finally, four variables maintained their status as members of the lower communality third for both factor matrices: secluded, open, scenic, and tourist-oriented.

Three of the variables found stable in the first two communality categories (colorful, quiet, natural, unspoiled, and interesting) were also among those determined to be stable dimensions in the comparison of the configuration of factor loadings. One other variable, expensive, also remained in the upper third for both regions. However, it, unlike the other variables found stable in this comparison,

Table 29
Communalities By Region*

VARIABLE	COMMUNALITY SIDE "A"	COMMUNALITY SIDE "B"	ABSOLUTE DIFFERENCE IN PERCENT
accessible	45.8%	22.9%	22.9%
clean	35.3%	35.5%	0.2%
secluded	17.6%	28.0%	10.4%
expensive	54.3%	81.8%	27.6%
open	14.4%	29.4%	15.0%
forested	35.8%	56.3%	20.6%
friendly	38.9%	47.1%	8.2%
peaceful	56.6%	31.8%	24.8%
pleasant	42.7%	31.2%	11.5%
middle-class-oriented	31.2%	33.8%	2.6%
sandy	40.8%	28.7%	12.0%
fun	36.8%	44.7%	7.8%
family-oriented	47.5%	32.5%	15.0%
courteous	47.4%	41.9%	5.6%
enjoyable	57.6%	40.9%	16.7%
scenic	34.2%	20.4%	13.8%
unspoiled	36.8%	34.8%	2.0%
colorful	50.4%	44.0%	6.4%
appealing	50.6%	36.7%	13.9%
delightful	58.8%	41.5%	17.4%
outdoor-oriented	25.2%	43.9%	18.7%
interesting	44.6%	32.5%	12.0%
tourist-oriented	32.2%	26.9%	5.4%
quiet	61.2%	64.1%	2.9%
natural	53.1%	56.0%	3.0%
restful	60.3%	41.3%	18.9%
developed	20.7%	39.8%	19.1%

* Communalities reported are for the rotated matrices.

Table 30
Variables Classified into Communality Thirds
(Upper, Middle, and Lower) by Region

	SIDE "A"	SIDE "B"
UPPER THIRD	* quiet	* expensive
	restful	* quiet
	delightful	forested
	enjoyable	* natural
	peaceful	friendly
	* expensive	fun
	* natural	* colorful
	appealing	outdoor-oriented
	* colorful	courteous
MIDDLE THIRD	family-oriented	delightful
	courteous	restful
	accessible	enjoyable
	* interesting	developed
	pleasant	appealing
	sandy	clean
	friendly	* unspoiled
	fun	middle-class-oriented
	* unspoiled	* interesting
LOWER THIRD	forested	family-oriented
	clean	peaceful
	* scenic	pleasant
	* tourist-oriented	* open
	middle-class-oriented	sandy
	outdoor-oriented	* secluded
	developed	* tourist-oriented
	* secluded	accessible
	* open	* scenic

* Indicates variables appearing in the same third across regions.

appeared as a specific factor (one on which only one variable loaded highly) in both loadings matrices.

These findings support the contention that elements of the factor structure of regional images remain stable across target regions. The following major heading is concerned with the vector comparison approaches to assessing the stability of factors across regions.

Vector Comparisons

The vector comparison techniques applied to compare factors across regions generally parrallel those used in the comparison across samples, with one exception. Since this comparison involves the same subjects and different sets of independent variables, in addition to correlating the factor loadings, the respondents' factor scores were also correlated across the two studies. Correlating factor scores is recommended in this case because similarity of the factor loadings does not guarantee similarity of factor scores in all cases. In summary, five vector comparison techniques will be used to compare factors across regions: (1) the correlation of factor loadings, (2) the correlation of factor scores, (3) the root mean square (RMS), (4) the coefficient of congruence (CC), and (5) the salient variable similarity index (S-Index). For the root mean square, the coefficient of congruence, and the S-Index the object of comparison was the factor loadings matrices.

<u>Pearson's Correlation Coefficient (r) of Factor Loadings</u>. Correlation coefficients were calcualted for each factor for Side "A" (A1 to A7) paired with each factor for Side "B" (B1 to B7) (Table 31). A number of factor pairs displayed correlation coefficients above .40: A1 and B4 (.63), A2 and B1 (.87), and A3 and B3 (.62). Each of these correlations were highly significant (at the Prob. < .05 level). Other significant factor pairs were: A3 and B2 (.42) and A4 and B1 (.39). All of these factor pairs

Table 31
Factor Comparison Across Regions Using the Correlation (Pearson's r) of Factor Loadings

	B1	B2	B3	B4	B5	B6	B7
	--	--	--	--	--	--	--
A1	0.00	0.32	0.05	0.63	-0.39	0.20	-0.31
	(.987)	(.109)	(.808)	(.001)	(.043)	(.307)	(.111)
A2	0.87	0.14	-0.08	-0.31	-0.35	0.05	-0.40
	(.001)	(.109)	(.675)	(.121)	(.075)	(.790)	(.041)
A3	0.16	0.42	0.62	-0.14	-0.23	0.01	-0.45
	(.421)	(.028)	(.001)	(.479)	(.243)	(.949)	(.019)
A4	0.39	0.33	0.52	-0.12	-0.35	-0.49	-0.31
	(.047)	(.097)	(.006)	(.546)	(.071)	(.010)	(.121)
A5	-0.29	0.25	-0.17	0.39	-0.15	-0.28	0.20
	(.137)	(.215)	(.388)	(.046)	(.466)	(.157)	(.326)
A6	-0.55	-0.18	0.01	-0.13	0.03	0.40	0.45
	(.003)	(.381)	(.961)	(.534)	(.893)	(.037)	(.019)
A7	0.25	0.36	0.04	0.18	-0.72	0.37	-0.35
	(.211)	(.062)	(.852)	(.379)	(.001)	(.059)	(.071)

Note: Factors A1 to A8 are from Side "A".
Factors B1 to B8 are from Side "B".
Parentheses indicate the significance level.

were also determined to be similar in the section on the visual approaches used to evaluate factor structure across regions.

Although there were other pairs of factors which displayed correlations that were significant at the .05 level, most were inverse relationships. The next section of this analysis considers the correlation of respondents' factor scores across regions.

Pearson's Correlation Coefficient (r) of Factor Scores. As in the preceeding comparison, correlations were computed for all the possible combinations of factors across the two regions. This time, however, factor scores for each respondent were used as the object of comparison.

As seen in Table 32, the correlations of factor scores are generally lower than those based on the factor loadings; the highest coefficient calculated was .31 (for factor pair A2 and B1). Thus, none of the factor pairs met the cutoff level of .40 for this measure. Nevertheless, several factor pairs did display relatively notable coefficients for this comparison, they include: A1 with B4 (.23), A2 with B1 (.31), A2 with B2 (.22), A4 with B1 (.24), and A5 with B4 (.29). The majority of these pairs were among those found to be similar in the previous comparisons. The exceptions include: A2 with B2 and A5 with B4. An inspection of the loadings for these two factors shows that their similarity lies in the number of near-zero

Table 32
Factor Comparison Across Regions Using the
Correlation (Pearson's r) of Factor Scores

	B1	B2	B3	B4	B5	B6	B7
A1	0.06 (.401)	0.13 (.078)	0.04 (.541)	0.23 (.002)	0.01 (.845)	0.14 (.048)	0.06 (.441)
A2	0.31 (.001)	0.22 (.002)	0.02 (.742)	0.12 (.089)	-0.01 (.885)	0.00 (.947)	0.13 (.071)
A3	0.16 (.029)	0.22 (.002)	0.17 (.019)	0.07 (.312)	-0.00 (.957)	0.03 (.665)	0.06 (.390)
A4	0.24 (.001)	0.08 (.261)	0.14 (.051)	0.04 (.549)	0.12 (.111)	-0.00 (.956)	0.11 (.143)
A5	0.10 (.188)	-0.06 (.424)	-0.08 (.299)	0.29 (.001)	-0.05 (.463)	0.01 (.894)	0.17 (.023)
A6	-0.02 (.819)	-0.00 (.951)	0.09 (.244)	0.05 (.481)	0.02 (.748)	0.24 (.001)	0.25 (.001)
A7	0.01 (.919)	0.05 (.520)	-0.10 (.172)	-0.12 (.102)	-0.20 (.006)	-0.00 (.993)	-0.20 (.006)

Note: Factors A1 to A8 are from Side "A".
Factors B1 to B8 are from Side "B".
Parentheses indicate the significance level.

loadings found in each factor. When the number of correlations computed is this high, it is not unusual to find a number of significant but meaningless correlations.

None of the correlations computed in this analysis reached the criterion level of .40, although many were statistically significant. Once again, those factor pairs identified as similar in previous comparisons performed relatively well on this measure compared to the rest. The next comparative measure to be discussed is the root mean square.

Root Mean Square (RMS). The RMS for each pair of factors is presented in Table 33. As in the comparison across samples using the RMS, none of the factor pairs in this comparison attained the required level of .10. Nevertheless, the results of this comparison parrallel those of the others. The factor pairs identified as similar in the previous comparisons performed relatively better than the rest. The factor pairs with substantial RMS coefficients in this comparison were: A1 with B4 (.17), A2 with B1 (.11), A3 with B2 (.19), and A3 with B3 (.15). As before, the RMS coefficients were low; indicating that the magnitude of the loadings between the two matrices is generally similar.

Table 33
Factor Comparison Across Regions Using the
Root Mean Square (RMS) of Factor Loadings

	B1	B2	B3	B4	B5	B6	B7
A1	0.28	0.21	0.25	0.17	0.35	0.27	0.35
A2	0.11	0.24	0.27	0.29	0.34	0.27	0.35
A3	0.26	0.19	0.15	0.27	0.32	0.27	0.34
A4	0.21	0.20	0.17	0.26	0.32	0.31	0.32
A5	0.32	0.21	0.26	0.19	0.27	0.26	0.23
A6	0.34	0.26	0.25	0.24	0.23	0.17	0.18
A7	0.32	0.26	0.30	0.26	0.33	0.19	0.28

Note: Factors A1 to A8 are from Side "A".
Factors B1 to B8 are from Side "B".

Although none of the coefficients calculated using the RMS -- the strictest measure of factor similarity -- were low enough to meet the criterion level, the factor pairs determined to be similar before performed the best. The next comparison presented uses the coefficient of congruence to assess the similarity of factors across the two target regions.

Coefficient of Congruence (CC). The coefficient of congruence for each factor pair is presented in Table 34. Several pairs of factors did achieve the criterion level (.80) for this measure of factor similarity, including: A1 with B4 (.83), A2 with B1 (.94), A3 with B3 (.83), and A4 with B3 (.81). With the exception of the last factor pair, all were also found to be similar using the previous methods used to compare factors.

The last factor pair, A4 with B3, was not previously identified as similar. The factor loadings for these two factors are somewhat comparable moving from variable to variable in Table 24, but they only share a small number of high loadings. The majority of what is similar between the two are the large number of near-zero loadings.

The CC for factor pairs which did not reach the .80 level for this measure but were found to be similar in previous comparisons were: .75 for factor pair A3 and B2, and .76 for A4 with B1. Although they did not reach the required level, the coefficients for these factor pairs were also notable.

Table 34
Factor Comparison Across Regions Using the Coefficient of Congruence (CC) of Factor Loadings

	B1	B2	B3	B4	B5	B6	B7
A1	0.61	0.73	0.63	0.83	0.02	0.46	-0.04
A2	0.94	0.63	0.53	0.36	0.01	0.35	-0.12
A3	0.64	0.75	0.83	0.45	0.09	0.33	-0.15
A4	0.76	0.73	0.81	0.49	0.04	0.06	-0.04
A5	0.36	0.62	0.42	0.66	0.10	0.09	0.28
A6	0.15	0.34	0.44	0.32	0.20	0.54	0.48
A7	0.27	0.34	0.14	0.23	-0.63	0.39	-0.31

Note: Factors A1 to A8 are from Side "A".
Factors B1 to B8 are from Side "B".

This comparison has provided more evidence that similarities exist between factors across regions. Several of the factor pairs which compared favorably before, performed well using this measure. The final method applied to assess factor similarity across regions was the S-Index, the subject of the next major heading.

<u>Salient Variable Similarity Index (S-Index)</u>. The S-Index values for all factor pairs are presented in Table 35 below. Six factor pairs in that table had S-Index values in excess of the criterion level for this measure (.80) -- A1 with B2 (.82), A2 with B1 (.82), A2 with B3 (.85), A3 with B2 (.81), A4 with B1 (.84), and A4 with B3 (.87). Only three of these pairs were among those

Table 35
Factor Comparison Across Regions Using the Salient Variable Similarity Index (S-Index) of Factor Loadings

	B1	B2	B3	B4	B5	B6	B7
A1	0.75	0.82	0.78	0.72	0.21	0.38	0.12
A2	0.82	0.79	0.85	0.58	0.07	0.52	0.19
A3	0.79	0.81	0.77	0.60	0.22	0.40	0.13
A4	0.84	0.76	0.87	0.65	0.07	0.20	0.00
A5	0.55	0.69	0.59	0.63	0.09	0.24	0.31
A6	0.25	0.52	0.42	0.39	0.10	0.58	0.32
A7	0.32	0.40	0.38	0.20	0.00	0.70	-0.08

Note: Factors A1 to A8 are from Side "A".
Factors B1 to B8 are from Side "B".

consistently identified as similar before: A2 with B1, A3 with B2, and A4 with B1. As was discussed in the comparison across samples, the number of factor pairs with substantial S-Index values is largely a function of the criteria used to classify the loadings into categories prior to the calculation of the S-Index itself.

S-Index values for the other factor pairs found similar in the previous comparisons are: .72 for A1 with B4 and .77 for A3 with B3 -- values which are relatively close to the cutoff value for this measure.

Once again, none of the factor pairs determined to be similar in this comparison met the requirements for use of the S-Index probability tables. Thus, the significance of the calculated S-Index values could not be assessed. Regardless of the inability to apply significance tests to the calculated S-Index values, this analysis has verified that several factor pairings are stable across target regions. Although a number of factor pairs emerged as similar under this measure, several were not meaningful matches. Those factor pairs found similar in previous comparisons, once again, performed relatively well.

The results of the five vector comparison measures for the seven factors for Side "A" across the seven factors for Side "B" are offered in Table 36 below. None of the factor pairs tested met the required level for two of the ten measures used in this analysis: the correlation of factor scores and the root mean square. As in the comparison across samples, a minority factor pairs emerged as similar in the majority of the comparisons (A1 with B4 and A2 with B1), several did so as well but were not as consistent across all the measures (A3 with B2 and A3 with B3), and a majority displayed no similarity at all.

Table 36
Factor Comparison Across Regions Using the Correlation of Factor Loadings, Correlation of Factor Scores, RMS, CC, and S-Index

SIDE "A" FACTOR	SIDE "B" FACTOR	CORRELATION OF FACTOR LOADINGS	CORRELATION OF FACTOR SCORES	RMS	CC	S-INDEX
1	1	-0.00	0.06	0.28	0.61	0.75
1	2	0.32	0.13	0.21	0.73	0.82
1	3	0.05	0.04	0.25	0.63	0.78
1	4	0.63 ***	0.23 **	0.17	0.83	0.72
1	5	-0.39 *	0.01	0.35	0.02	0.21
1	6	0.20	0.14 *	0.27	0.46	0.38
1	7	-0.31	0.06	0.35	-0.04	0.12
2	1	0.87 ***	0.31 ***	0.11	0.94	0.82
2	2	0.14	0.22 **	0.24	0.63	0.79
2	3	-0.08	0.02	0.27	0.53	0.85
2	4	-0.31	0.12	0.29	0.36	0.58
2	5	-0.35	-0.01	0.34	0.01	0.07
2	6	0.05	0.00	0.27	0.35	0.52
2	7	-0.40 *	0.13	0.35	-0.12	0.19
3	1	0.16	0.16 *	0.26	0.64	0.79
3	2	0.42 *	0.22 **	0.19	0.75	0.81
3	3	0.62 ***	0.17 *	0.15	0.83	0.77
3	4	-0.14	0.07	0.27	0.45	0.60
3	5	-0.23	-0.00	0.32	0.09	0.22
3	6	0.01	0.03	0.27	0.33	0.40
3	7	-0.45 *	0.06	0.34	-0.15	0.13
4	1	0.39 *	0.24 ***	0.21	0.76	0.84
4	2	0.33	0.08	0.20	0.73	0.76
4	3	0.52 **	0.14	0.17	0.81	0.87
4	4	-0.12	0.04	0.26	0.49	0.65
4	5	-0.35	0.12	0.32	0.04	0.07
4	6	-0.49 *	-0.00	0.31	0.06	0.20
4	7	-0.31	0.11	0.32	-0.04	0.00
5	1	-0.29	0.10	0.32	0.36	0.55
5	2	0.25	-0.06	0.21	0.62	0.69
5	3	-0.17	-0.08	0.26	0.42	0.59
5	4	-0.39 *	0.29 ***	0.19	0.66	0.63
5	5	-0.15	-0.05	0.27	0.10	0.09
5	6	-0.28	0.01	0.26	0.09	0.24
5	7	0.20	0.17 *	0.23	0.28	0.31

Table 36 (Continued)

SIDE "A" FACTOR	SIDE "B" FACTOR	CORRELATION OF FACTOR LOADINGS	CORRELATION OF FACTOR SCORES	RMS	CC	S-INDEX
6	1	-0.55 **	-0.02	0.34	0.15	0.25
6	2	-0.18	-0.00	0.26	0.34	0.52
6	3	-0.01	0.09	0.25	0.44	0.42
6	4	-0.13	0.05	0.24	0.32	0.39
6	5	0.03	0.02	0.23	0.20	0.10
6	6	0.40 *	0.24 ***	0.17	0.54	0.58
6	7	0.45 *	0.25 ***	0.18	0.48	0.32
7	1	0.25	0.01	0.32	0.27	0.32
7	2	0.36	0.05	0.26	0.34	0.40
7	3	0.04	-0.10	0.30	0.14	0.38
7	4	0.18	-0.12	0.26	0.23	0.20
7	5	-0.72 ***	-0.20 **	0.33	-0.63	0.00
7	6	0.37	-0.00	0.19	0.39	0.70
7	7	-0.35	-0.20 **	0.28	-0.31	-0.08

*** Prob < .001
** Prob < .01
* Prob < .05

Summary

The results from the preceding analyses are summarized in Table 37. From this exihibit it is clear that several factors remained stable across samples and across regions. Although the variables involved on these factors varied considerably, many were invariant across the two comparisons. In short, the factors found stable across studies can be summarized in three underlying dimensions.

Tables 38 through 40 display the configuration of factor loadings for the comparable factors from the two comparisons on the three underlying dimensions. Since these dimensions have displayed stability it is reasonable to assign them a name.

The first underlying dimension presented (Table 38) appeared in varying degrees in six factors from the two comparisons (F1, T1, T6, A3, B2, and B3). The variables involved on these factors include: sandy, fun, enjoyable, colorful, appealing, delightful, outdoor-oriented, and interesting. Together, this collection of terms conveys a sense of enthusiasm with the tourism environment. This dimension was labeled Environmental Excitement.

The second dimension, as presented in Table 39, was embodied in five factors across the two comparisons (F2, T4, A2, A4, and B1). The seven variables which are found on

Table 37
Highlights of the Results for the Comparison Across Samples and the Comparison Across Regions

TYPE OF COMPARISON	COMPARISON ACROSS SAMPLES	COMPARISON ACROSS REGIONS
Number of Factors with Eigenvalues > 1	Frankfort - 8 Tawas - 9	Side "A" - 8 Side "B" - 7
Percent of Variance Explained:		
- Factor to Factor	Within 2% for all 27 factors	Within 2% for 26 of 27 factors
- Matrix to Matrix	Within 5% across matrices	Within 5% across matrices
Configuration of the Loadings	F1 with T1 & T6 F2 with T4 F3 with T2	A1 with B4 A2 & A4 with B1 A3 with B2 & B3
Complexity:		
- of the Variables	None in common	None in common
- of the Factors	F1 with T1 & T6 F2 with T4 F3 with T2	A1 with B4 A2 & A4 with B1 A3 with B2 & B3
Communality of the Variables	4 remained in the upper 1/3	4 remained in the upper 1/3
Correlation of Factor Loadings	F1 with T1 & T6 F2 with T4	A1 with B4 A2 with B1 A3 with B2 & B3 A4 with B3
Correlation of Factor Scores	(Not Applicable)	No correlations were > .40
Root Mean Square (RMS)	No coefficients were < .10	No coefficients were < .10
Coefficient of Congruence (CC)	F1 with T1 F2 with T4	A1 with B4 A2 with B1 A3 & A4 with B3
Salient Variable Similarity Index (S-Index)	F1 with T1 F2 with T4	A1 with B2 A2 with B1 & B3 A3 with B2 A4 with B1 & B3

Table 38
Configuration of the Highest Loading Variables for Dimension 1 -- Environmental Excitement

VARIABLE	F1	T1	T6	A3	B2	B3
accessible						
clean		0.41				
secluded						
expensive						
open						
forested						
friendly						
peaceful						
pleasant						
middle-class-oriented						
sandy	0.43		0.85			0.48
fun	0.62	0.52		0.40	0.44	0.44
family-oriented					0.47	
courteous						
enjoyable	0.74	0.56		0.38	0.50	
scenic						
unspoiled						
colorful	0.42	0.63		0.61		0.60
appealing	0.46		0.42			
delightful				0.48		0.52
outdoor-oriented	0.46				0.52	
interesting	0.43	0.52		0.58	0.40	
tourist-oriented						
quiet						
natural						
restful						
developed						

Table 39
Configuration of the Highest Loading Variables for Dimension 2 -- Undeveloped Tranquility

VARIABLE	F2	T4	A2	A4	B1
accessible					
clean					
secluded	0.48		0.40		0.43
expensive					
open					0.46
forested					
friendly					
peaceful	0.44		0.46	0.44	0.48
pleasant				0.51	0.42
middle-class-oriented					
sandy				0.48	
fun					
family-oriented					
courteous					
enjoyable				0.40	
scenic					
unspoiled	0.55		0.41		0.48
colorful					
appealing				0.48	
delightful	0.48				
outdoor-oriented					
interesting					
tourist-oriented					
quiet	0.63	0.65	0.72		0.77
natural	0.45	0.49	0.50		0.53
restful	0.42	0.57	0.56		0.51
developed					

Table 40
Configuration of the Highest Loading Variables for Dimension 3 -- Service Orientation

VARIABLE	F3	T2	A1	B4
accessible				0.43
clean				
secluded				
expensive				
open				
forested		0.65	0.41	
friendly	0.40	0.50	0.58	0.53
peaceful			0.38	
pleasant				
middle-class-oriented			0.46	0.52
sandy				
fun				
family-oriented	0.47		0.60	
courteous	0.67	0.45	0.54	0.54
enjoyable				
scenic				
unspoiled				
colorful				
appealing				
delightful		0.39	0.44	
outdoor-oriented				
interesting				
tourist-oriented				
quiet				
natural				
restful				
developed				

those factors were: secluded, peaceful, pleasant, unspoiled, quiet, natural, and restful -- terms which reflect a serene and relaxing setting. The dimension was named Undeveloped Tranquility.

The final dimension was found in four factors from the two comparisons (Table 40). It was comprised of two variables which appeared in all four factors -- friendly and courteous; and four variables which appeared in at least two factors -- forested, middle-class-oriented, family-oriented, and delightful. With the exception of forested, these variables all relate to a sense of hospitality towards tourists. This dimension was labeled Service Orientation.

This chapter has presented the results of two investigations into the invariance of the factor structure underlying images of tourism destinations; one concerned with factor stability between samples for the same target region, the other with factor stability between regions for the same sample. The methods employed to assess stability in each case entailed both visual and vector comparison approaches. Three dimensions underlying respondents' images of the target regions were found to be stable in both analyses. The three dimensions were labeled: Environmental Excitement, Undeveloped Tranquility, and Service Orientation. The findings of the present comparisons are synthesized and their meaning interpreted in the following chapter.

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CHAPTER V

DISCUSSION, CONCLUSIONS, LIMITATIONS, AND RECOMMENDATIONS

Discussion and Conclusions

The findings of the present study were obtained from the comparison of factor structure across samples and across regions. Before discussing these findings, however, it is important to realize that this analysis was not concerned with quantitative differences between destinations or between tourists' perceptions of those destinations. Instead, the focus was on differences in the important qualities present in the data -- the dimensionality of the data. As Stewart (1981) points out, a dimension does not indicate how much different various entities are, just as knowing that weight is an important physical attribute does not indicate how much heavier one object is than another. Quantitative differences may very well be important, but the identification of a particular dimension does not provide that information. In short, understanding the dimensional structure which underlies a phenomenon, in this case a destination's image, is a logical first step to understanding these quantitative differences. Thus, this analysis is best thought of as a preliminary step for future investigations into how visitors perceive tourism destinations.

Given this base, several of the findings from this analysis are worth noting here.

First, both of the comparisons conducted -- across samples and across regions -- found the same three dimensions underlying respondents' images of the study regions -- Environmental Excitement, Undeveloped Tranquility, and Service Orientation. While the number of factors and the configuration of the variables comprising each dimension was not identical, there was enough convergence on these indicators to clearly distinguish the three dimensions.

In addition, all three of these dimensions have appeared in previous investigations of regional images in other factor analytic studies. The factor termed Environment appeared in an investigation of the dimensions of tourist satisfaction with Cape Cod, Massachusetts by Pizam et al. (1978) and is very similar to the dimension Environmental Excitement which was found in this study. The factor in that study, was made up of the following variables: scenery and natural attractions, quality of attractions, and environmental quality. In addition, the dimension Environmental Excitement generally compares well with Craik's (1975) factor beautiful-picturesque -- each conveys a good feeling derived from the landscape.

The two other stable dimensions, Undeveloped Tranquility and Service Orientation, can be found incorporated in the factors which emerged in McCullough's (1977) investigation into the images of tropical destinations held by experienced "long-haul" travelers and travel agents. In that study, these two dimensions were embodied in three factors which were labeled natural-sophisticated, organized-unspoilt, and service oriented-cultural. Also, Craik's (1975) factor serene-gentle is composed of many of the same variables as the dimension Undeveloped Tranquility which was found in this study. Finally, Pizam et al. (1978) also identified the dimension Service Orientation in the factor he referred to as hospitality. In that study, this factor was composed of the following variables: willingness to aid tourists, general friendliness, general courtesy, and general hospitality.

In regard to the generalizability of these three dimensions to non-coastal destinations, two of the dimensions found in this study appear to be similar to the factors found in Craik's (1975) study of individual variations in landscape descriptions which used a non-coastal region as the target of respondents' images. This finding provides an indication that the dimensions underlying destination images may be similar, in some respects, for both coastal and non-coastal target regions. Additional, more definitive research needs to be conducted to determine if this is the case.

The identification of these three stable dimensions are of considerable importance for those involved in tourism research and the marketing of tourism destinations. For researchers involved with assessing how tourists perceive a

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given area, this findings serves to validate the contention that at least some of the dimensions involved in the factor structure of destination images remain stable across different groups of respondents and across different regions. These dimensions can be incorporated into the research instruments used to measure regional perceptions and, further, may be used to develop a general instrument which can be used for a range of target regions across a variety of respondent types.

From a marketing perspective, these stable dimensions can be emphasized in promotional campaigns which are either general to a range of destinations or are specific to a particular destination. Thus, the Michigan Travel Bureau may include these aspects in broad promotions designed to attract visitors to the state as a whole, or may use them to promote specific destinations such as the Upper Peninsula.

Finally, since these dimensions are stable across regions, they may also be used to position destinations from the perspective of the tourist. The dimensions used in a product positioning analysis from this particular application should be the more controllable dimensions of the three (for example: Environmental Excitement and Service Orientation). This type of analysis could be used to compare perceptions of competing destinations, compare first-time versus repeat visitors' perceptions, or track changes in how a destination is perceived over time. In addition, a product positioning analysis can be used as a first step in selecting target market segments for promotional strategies. For example, after completing a product positioning analysis, the results can be used to select the segment with the most favorable image of the destination in question to build upon the favorable image, or, alternatively, select those respondents with the least favorable image in hopes of improving it. In summary, these results lend themselves well to both measurement and marketing uses.

One must recognize that the identification of three stable dimensions underlying destination images in this research does not exhaust the possibility that additional stable dimensions may exist. In fact, most of the studies presented in this research included at least eight dimensions to describe an area's attractivity (for example, see Gearing et al., 1974, and Pizam et al., 1978).

The inability to identify more than three stable dimensions in this research may be explained by several reasons. The first involves the constraints imposed by the data set. The data used in this study was not collected with this particular analysis in mind. The original study was chiefly concerned with environmental descriptions of the target regions. As such, respondents' images of regional attributes (for example) were not included in the analysis. In addition, in some cases, only one variable was included among the 27 adjectives comprising the reduced data set to describe a particular aspect of a region's image. For example, the variable expensive emerged as a specific factor

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for both sides of the state in the comparison across regions. However, since only one variable was involved on this factor for both matrices, it could not be considered as stable according to the pre-established criteria. Nevertheless, it is reasonable to expect that this dimension may be quite central to one's image of a particular tourism destination.

The second reason for not finding additional invariant dimensions is that differences may well exist in how people use everyday language to evaluate tourism destinations. For instance, what may mean quaint to one person, may mean backwards to another. Further, the orthogonality imposed on the initial factor matrix by factor rotation may not be realistic considering the interrelationships that normally exist between the components comprising the totality of a given tourism destination. For example, one is likely to find quality eating establishments in an area known for plush hotel accommodations -- dimensions which researchers almost always consider independently, but which tourists are likely to take into account as one in their mind. Thus, the variables used to operationalize specific components' of regional images originally hypothesized as inclusive in the adjective checklist may not have been commonly understood by the majority of the sample of tourists, or may have been mixed in with other components in tourists' minds and, therefore, were not identified as stable in this analysis.

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Another finding which surfaced in this analysis concerns two of the measures used to assess factor similarity -- the root mean square (RMS) and the correlation of factor loadings. The inability of these two measures to indicate similarity for a given pair of factors when other measures found that pair to be similar may be explained by one of three reasons. First, the factors compared may in fact, not be similar (according to these measures). Second, the criteria established for these measures may have been to strict. And third, problems with the data, rather than problems with the measures themselves may have caused the questionable results for these measures. In particular, the dichotomous nature of the original data may have caused the resulting RMS coefficients and factor scores (and thus the correlations calculated using those scores) to perform poorly. It was previously mentioned that generating factor scores from dichotomous data is not wholely consistent with the factor analytic model. Kim and Mueller (1978) point out that it is assumed, when calculating factor scores, that the original variables contain at least four different values (as opposed to the two values embodied in dichotomous data). A replication of the study using an ordinal scale (at the least) should be made to determine if this is the reason for the poor performance of these measures.

In conclusion, the author believes that much was learned about the stability of the factor structure underlying regional images. Three stable dimensions emerged which were invariant across samples and across regions. These dimensions were labeled: Environmental Excitement, Undeveloped Tranquility, and Service Orientation. All three had been identified in previous studies involving destination images.

Study Limitations

There were several limitations and assumptions which relate to the research design of this analysis which should be acknowledged. The present study is limited in the following way:

1. Only images of coastal destinations were considered in this study. Thus, one must question the generalizability of the three dimensions which emerged from this analysis. In addition, it is not known how these results would compare to similar research in regions with coastal destinations outside of Michigan. Information on the stability of destination images across both coastal and non-coastal settings and in settings outside of Michigan would enhance this investigation and provide tourism researchers with a better understanding of the congruence of regional images across a variety of destination types.
2. Regarding the comparison across samples, since only images of one target (coastal) region were compared it is difficult to assess the generalizability of this particular analysis to other (coastal) regions. This information would complement the present analysis and permit a more complete investigation of the stability of regional images across samples.

3. The two areas used as target regions in this study may not have been defined well enough to allow respondents to clearly distinguish between the two (for example, both regions -- Side "A" and Side "B" -- included the coastline at the tip of the Lower Peninsula). This problem, of defining regional boundaries, is neither new for tourism research in general nor for research in Michigan in particular. Nevertheless, this may be a major limitation of the present study.
4. The sample sizes used in both comparisons, especially the comparison across samples, were just within the minimal requirements to assure reliable results for the factor analyses. As such, it was not possible to screen those samples to assure that each consisted of respondents with the same level of familiarity with each target region. At the least, it would have been desirable to screen out those respondents who were year-round residents of the particular site being sampled. A sampling control of this nature would have assured that only members of the target population -- tourists who were on vacation in the areas selected as sampling sites -- were included in the analysis.

5. Two assumptions underlied the present study. First, it was assumed that the information derived from the adjective checklist adequately represented respondents images of the two target regions. And second, it was assumed that the validity and reliability of the 1982 Frankfort-Tawas Study, an original data collection effort, were sufficient for the purpose of the present study.

Recommendations

On the basis of the results from the present study, the following are recommended to facilitate future research:

1. An application of the results of this study to assess quantitative differences in visitor images between the two study regions and between similar subsamples of tourists. Such an investigation can be used for product positioning analysis, market segmentation analysis, the development of advertising strategies, and the development of site choice models.
2. An investigation into the stability of the dimensions of coastal and non-coastal tourism destination regions both inside and outside of Michigan. Such an undertaking would foster the development of a general research instrument which may then be applied to a variety of study sites.

3. A replication of this study should be conducted with larger sample sizes in order to control for respondents with different levels of familiarity with the target regions in question. This would increase confidence in the results of the study.
4. Compare images of more than one target region across samples so that this aspect of the present study can be more fully understood. Knowing that different groups of respondents utilize the same underlying criteria to evaluate different destinations would permit the establishment of a more general research instrument to assess visitor images of tourism destinations.
5. A replication of the present study using matrix comparison techniques in addition to the visual and vector comparison techniques.
6. A replication of the present study with more clearly defined regional boundaries would improve its reliability.
7. A replication of the present study using a modified measurement scale (e.g. ordinal versus dichotomous) to operationalize respondent images of the target regions. It is likely that a higher level measurement scale would improve the results of the present study, especially the

generation of factor scores and would facilitate the use of other statistical tools such as cluster analysis and multidimensional scaling.

8. Further research into the stability of the dimensions underlying destination images across different types of respondent groups (e.g. first time visitors and repeat visitors, visitors and non-visitors, campers and hotel/resort users, etc.) and across different types of destinations (e.g winter destinations) would greatly expand current knowledge in this area.

Summary

The main purpose of this study was to investigate the stability of the subjective criteria tourists use to evaluate tourism destinations. A review of the literature relative to this issue demonstrated: the usefulness of factor analysis in image research, applications of factor analysis to the study of regional images, the techniques used to compare factor structure across studies, and applications of those techniques in recreation and leisure research. It was concluded that little, if any, research has focused upon the stability of the factor structure underlying destination images. With this in mind the present study was undertaken as an exploratory investigation. For the purpose of this study, two research questions were developed which focused on determining whether any of the dimensions underlying destination images remain stable across different groups of respondents for the same region, and across different regions for the same group of respondents.

Because of limited time and financial resources, existing cross-sectional data were used for the analysis. The data specifically used for the analysis was taken from the 1982 Frankfort-Tawas Study, a study conducted by the Department of Park and Recreation Resources, Michigan State University.

The survey population consisted of 287 respondents who were vacationing in the Frankfort and Tawas areas of Michigan. Visitor images of two target regions -- Side "A" (the northwestern coastline of Michigan's Lower Peninsula) and Side "B" (the northeastern coastline of Michigan's Lower Peninsula) -- were assessed through the use of two adjective checklists (one for each target region).

A comparison of the factor structure underlying visitor images was first conducted across samples of respondents -- Frankfort subsample (N = 134) and Tawas subsample (N = 125) -- for the same target region -- Side "A". The techniques used to compare factor structure in this particular analysis were both visual comparison methods (the number of factors with eigenvalues greater than one, the percent of total variance explained, the configuration of factor loadings, the complexity of the factor structure, and the communalities of the variables) and vector comparison methods (Pearson's correlation coefficient (r), root mean square (RMS), coefficient of congruence (CC), and the salient variable similarity index (S-Index)) using the factor loadings as the object of comparison.

A similar analysis was conducted for the comparison of factor structure across target regions (Side "A" and Side "B") for the same group of respondents (N = 188). In this analysis, all the factor comparison techniques applied in the comparison across samples were used with the addition of Pearson's correlation coefficient (r) being applied to the factor scores matrix.

The results of each comparison indicated that three dimensions underlying the factor structure of visitor images remained stable in both of the comparisons. The three dimensions were labeled: Environmental Excitement, Undeveloped Tranquility, and Service Orientation. All three were shown to be similar to factors found in prior research involving destination images.

APPENDIX A

1982 Frankfort-Tawas Study: Questionnaire, Study Sites, and Demographic Profile

MICHIGAN RECREATION AND TOURISM IMAGE SURVEY
Park and Recreation Resources - Michigan State University

We are interested in what you think about Michigan. It is not important that you have been to all of the regions in the state to answer the questions. Your answers will be held confidential. Thank you for your help and cooperation!

Please use the map at left to complete the following question.

1. The following is a list of adjectives. Please read them quickly and check each one you would consider descriptive of coastal area A shown on the map at left.

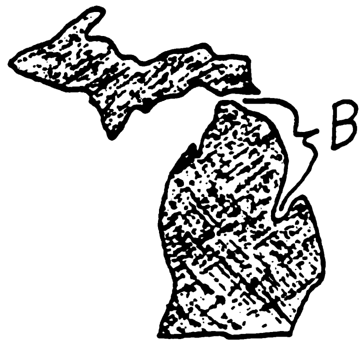
____ accessible
____ clean
____ crowded
____ secluded
____ drab
____ flat
____ expensive
____ open
____ forested
____ friendly
____ unusual
____ peaceful
____ pleasant
____ middle class oriented
____ sandy
____ ugly
____ monotonous
____ clear
____ hostile
____ fun

____ family oriented
____ spirited
____ accepting
____ courteous
____ gracious
____ enjoyable
____ tacky
____ spectacular
____ primitive
____ remote
____ scenic
____ unspoiled
____ colorful
____ quaint
____ upper class oriented
____ alive
____ appealing
____ bright
____ commercial oriented
____ delightful

____ exciting
____ festive
____ outdoor oriented
____ horrible
____ out-of-the-way
____ lifeless
____ nondescript
____ noisy
____ interesting
____ tourist oriented
____ quiet
____ natural
____ restful
____ developed
____ tasteless
____ classy
____ heavy traffic
____ busy

If you feel you cannot fill out the above question, please check why below.

____ Haven't been there.
____ Haven't been there, but I'm willing to give my impressions.
(Please complete this page if you check this response)
____ Not familiar enough to fill this out.
____ Other, please specify.



Please use the map at left to complete the following question.

2. The following is a list of adjectives. Please read them quickly and check each one you would consider descriptive of coastal area B shown on the map at left.

____accessible
____clean
____crowded
____secluded
____drab
____flat
____expensive
____open
____forested
____friendly
____unusual
____peaceful
____pleasant
____middle class oriented
____sandy
____ugly
____monotonous
____clear
____hostile
____fun

____family oriented
____spirited
____accepting
____courteous
____gracious
____enjoyable
____tacky
____spectacular
____primitive
____remote
____scenic
____unspoiled
____colorful
____quaint
____upper class oriented
____alive
____appealing
____bright
____commercial oriented
____delightful

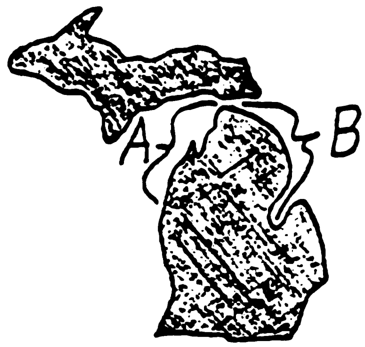
____exciting
____festive
____outdoor oriented
____horrible
____out-of-the-way
____lifeless
____nondescript .
____noisy
____interesting
____tourist oriented
____quiet
____natural
____restful
____develped
____tasteless
____classy
____heavy traffic
____busy

If you feel you cannot fill out the above question, please check why below.

_____Haven't been there.
_____Haven't been there, but I'm willing to give my impressions.
(Please complete this page if you check this response)
_____Not familiar enough to fill this out.
_____Other, please specify.

3. The following is a list of activities, characteristics and facilities that you might find while in the two areas of Michigan shown on the map at left. Thinking of these two coastal areas, please check which of the two you feel would best provide for each of the following:

	Coastal Area A	Coastal Area B
Tourist attractions		
Peace and quiet		
Family entertainment		
Expensive entertainment		
Vacations		
Historical interest		
Places to eat		
Places to shop		
Lake access		
Beach activities		
Swimming		
Sailing		
Boating		
Picnicking		
Charter fishing		
Fishing		
Hunting		
Photography		
Natural areas		
Observing wildlife		
Hiking		
Camping		
Canoeing		



Please use the map at left to answer the following questions.

4. Please rate coastal area A on how well it provides for recreation and/or tourism opportunities. (Please circle one)

<u>Poor</u> <u>Excellent</u>

1 2 3 4 5 6 7

5. Please rate coastal area B on how well it provides for recreation and/or tourism opportunities. (Please circle one)

<u>Poor</u> <u>Excellent</u>

1 2 3 4 5 6 7

6. Please rate the State of Michigan, compared to other Great Lakes states, on how well it provides for recreation and/or tourism opportunities. (Please circle one)

<u>Poor</u> <u>Excellent</u>

1 2 3 4 5 6 7

7. Are you a resident of the area you are in now? ____yes ____no

<u>If yes</u>, how many years have you lived in the state? ________ years

<u>If no</u>, what is the purpose of your visit to this area? (Circle one)

____to visit friends or relatives ____business and pleasure

____business ____pleasure

____vacation

____other, please specify ______________________________________

8. How familiar are you with coastal area A compared to the other coastal areas in Michigan?

extremely familiar   very familiar   somewhat familiar   not very familiar   not at all familiar

9. How familiar are you with coastal area B compared to the other coastal areas in Michigan?

extremely familiar	very familiar	somewhat familiar	not very familiar	not at all familiar

10. Sex: _____male _____female

11. Age: _______years

12. Education: Please circle the number that represents the highest level completed.

1 2 3 4 5 6 7 8	9 10 11 12	1 2 3 4 5 6 7+
Grade School	High School	College

13. Annual Family Income (before taxes)

___under $4,999	___ $15,000-$19,999	___$30,000-$34,999
___$5,000-$9,999	___$20,000-$24,999	___$35,000-$49,999
___$10,000-$14,999	___$25,000-$29,999	___$50,000 and over

14. When thinking about the area you are in right now, what one thing stands out most in your mind?

____

____

____

SAMPLE SITES: SUMMARY

Location: East Tawas Dock
Date: August 16
Time: 1400-1600
Weather: Partly cloudy, windy
Conditions: Many families walking along dock. Survey site was at only pt. of entrance on and off dock. Passed out surveys while stationary at this pt.

Location: Beach adjacent and north of East Tawas Dock
Date: August 16
Time: 1615-1700
Weather: Partly cloudy, windy
Conditions: People were lying or sitting on beach. Few swimming. Made one pass up beach and asked everyone on beach (12 and older) to fill out questionnaire.

Location: Campground at Tawas State Park
Date: August 17
Time: 1015-1215
Weather: Partly cloudy
Conditions: Flipped a coin and started on east side of campground and sampled sites sequentially. Asked campers at all occupied sites where campers were visible outside of their campers or tents.

Location: Tawas State Park Day-Use area
Date: August 17
Time: 1215-1425
Weather: Partly cloudy with darker clouds on west horizon
Confitions: Sample was from the north end of the beach southward to the point where the beach narrowed down from approximately 40 yards to 15 yards. Made one pass (north to south) and asked each group on beach during that time interval.

Location: Tawas City Resorts (south end of city)
Date: Sugust 17
Time: 1530-1700
Weather: Partly cloudy, getting darker
Conditions: Requested permisi n at four resorts and received permission to solicit people outside of their rooms. Bulk of those questionnaires cam from one resort. Other resorts either had no people present or managers were not available to request permission. Surveys all cam from 3 or 4 loosely organized groups.

SAMPLE SITES: SUMMARY

Location: Park right next to Pollice Station in Frankfort
Date: August 18
Time: 1400-1600
Weather: Partly cloudy
Conditions: Foot traffic was not very heavy with most stores being across the street. Was stationary for this sample.

Location: Frankfort beach (west end of town)
Date: August 18
Time: 1615-1815
Weather: Partly cloudy
Conditions: Started on beach below parking lot and worked up beach about a quarter mile to point where small cliffs meet the beach. Sampled people on way to and from cliffs as there were low numbers of people and the interviewer was able to pick up newcomers to beach in this manner.

Location: Mineral Park (two blocks east of Police Park)
Date: August 19: Time: 1000-1200
Weather: Overcast, threatening to rain
Conditions: Park was about five acres in size with a covered picnic area and marina. Data was collected along the marina and at picnic area. Just before noon it started raining and last few people filled out surveys under cover of the picnic area.

Location: Lake Park (Honor; about 12 miles north of Frankfort)
Date: August 19
Time: 1400-1600
Weather: Very overcast and windy. No rain however.
Conditions: Collecd most questionnaires as people landed their canoes at Canoe Landing on Platte River (canoes were coming from two canoe liveries about three miles upriver). Collected a few surveys from people parking and then walking to the beach.

Table B1
Demographic Profile by Subgroup

	Frankfort Respondents		Tawas City Respondents		Combined Respondents	
SEX OF RESPONDENT	N	%	N	%	N	%
Male	62	45.6%	73	48.3%	135	47.0%
Female	67	49.3%	71	47.0%	138	48.1%
Incomplete Data	7	5.1%	7	4.6%	14	4.9%
Total	136	100%	151	100%	287	100%
AGE OF RESPONDENT	N	%	N	%	N	%
Under 24	21	15.4%	38	25.2%	59	20.6%
25-34	30	22.1%	51	33.8%	81	28.2%
35-49	47	34.6%	35	23.2%	82	28.6%
50-64	21	15.4%	16	10.6%	37	12.9%
65+	9	6.6%	2	1.3%	11	3.8%
Incomplete Data	8	5.9%	9	6.0%	17	5.9%
Total	136	100%	151	100%	287	100%
Mean	39.7		32.5		35.9	
ANNUAL FAMILY INCOME	N	%	N	%	N	%
Under $4,999	6	4.4%	9	6.0%	15	5.2%
$5,000 to $9,999	4	2.9%	8	5.3%	12	4.2%
$10,000 to $14,999	7	5.1%	7	4.6%	14	4.9%
$15,000 to $19,999	8	5.9%	11	7.3%	19	6.6%
$20,000 to $24,999	19	14.0%	20	13.2%	39	13.6%
$25,000 to $29,999	14	10.3%	29	19.2%	43	15.0%
$30,000 to $34,999	9	6.6%	13	8.6%	22	7.7%
$35,000 to $49,999	33	24.3%	19	12.6%	52	18.1%
$50,000 and over	18	13.2%	9	6.0%	27	9.4%
Incomplete Data	18	13.2%	26	17.2%	44	15.3%
Total	136	100%	151	100%	287	100%
Median	$30-$34,999		$25-$29,999		$25-$29,999	
LEVEL (YEARS) OF EDUCATION	N	%	N	%	N	%
Grade School (11 or less)	7	5.1%	21	13.9%	28	9.8%
High School (12)	29	21.3%	61	40.4%	90	31.4%
College (13-16)	55	40.4%	41	27.2%	96	33.4%
Graduate School (17+)	39	28.7%	21	13.9%	60	20.9%
Incomplete Data	6	4.4%	7	4.6%	13	4.5%
Total	136	100%	151	100%	287	100%
Mean	15.0		13.3		14.1	

APPENDIX B

Listing of FACCOMP Data Analysis Program

```
PROGRAM FACCOMP3(INPUT,OUTPUT);

TYPE
OBS      =*RECORD
STUDY1  : REAL4;
STUDY2  : REAL4;
END;

     S_INDEX_TYPE =*RECORD
      S             : REAL4;
      HYCOUNT       : INTEGER;
     END;

VAR
TOTAL : INTEGER;
CASES       : ARRAY[1..200, 1..20]*OF OBS;
     RMS_TBL      : ARRAY[1..20, 1..20]*OF REAL4;
     CC_TBL       : ARRAY[1..20, 1..20]*OF REAL4;
     S_INDEX      : ARRAY[1..20, 1..20]*OF S_INDEX_TYPE;
     CT_TBL       : ARRAY[1..3, 1..3]*OF INTEGER;
     SUM          : ARRAY[1..20, 1..20]*OF REAL4;
     HOLD1, HOLD2 : INTEGER;
     TOP : INTEGER;
     BOTTOM : REAL4;
     PRINTER : TEXT;
     FACTOR, VARIABLE : CHAR;
     HOLD_SQR     : REAL4;
     HOLD_IT,
     SUM_STUDY1, SUM_STUDY2 : REAL4;
     FILENAME     : LSTRING(20);
NAME_ONE: LSTRING(20);
FILE_ONE     : LSTRING(14);
FACTOR_ID1    : LSTRING(10);
NO_COLUMNS1 : INTEGER2;
NO_ROWS1   : INTEGER2;
     X, Y           : INTEGER;

NO_COLUMNS2 : INTEGER2;
NO_ROWS2   : INTEGER2;
NAME_TWO: LSTRING(20);
FILE_TWO: LSTRING(14);
FACTOR_ID2    : LSTRING(10);

A,B,C         : INTEGER;
IN_VAR        : REAL4;
   VAR_X          : REAL4;
   DONE, BAD_FILE, VALID_CHAR : BOOLEAN;
   IN_CHAR            : CHAR;
   IN1, IN2           : TEXT;

(************************************************************)

BEGIN
WRITELN(' ');
WRITELN('FACCOMP1');
WRITELN('    A PROGRAM, WRITTEN BY JAMES J. BARRON AND DAVID B. KLENOSKY, DESIGNED TO');
WRITELN('    COMPARE FACTORS ACROSS STUDIES BY USE OF THE ROOT MEAN SQUARE (RMS),');
WRITELN('    THE COEFFICIENT OF CONGRUENCE (CC), AND THE SALIENT VARIABLE SIMILARITY');
WRITELN('    INDEX (S-INDEX).  THE PROGRAM WAS WRITTEN  MAY OF 1985.');
WRITELN(' ');
WRITELN('LIMITATIONS AND INPUT REQUIREMENTS:');
WRITELN('    THE PROGRAM IS USEFUL FOR FACTOR MATRICES COMPRISED OF A MAXIMUM OF');
WRITELN('    20 FACTORS/COLUMNS AND 200 VARIABLES/ROWS.  THE PROGRAM REQUIRES TWO');
WRITELN('    INPUTS FOR EACH FACTOR MATRIX.  THE FIRST IS AN IDENTIFICATION LETTER FOR');
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WRITELN('    EACH MATRIX.  THE SECOND IS THE FILE NAME OF EACH MATRIX (NOTE THAT THE ');
WRITELN('    FILE NAME MUST BE NO LONGER THAN EIGHT CHARACTERS AND CANNOT CONTAIN ANY ');
WRITELN('    SPECIAL CHARACTERS SUCH AS A PERIOD, ETC.).');
WRITELN(' ');
WRITELN('OUTPUT:');
WRITELN('    THE PROGRAM OUTPUTS FOUR SETS OF MATRICES: ONE FOR THE RMS, ONE FOR THE CC,');
WRITELN('    AND TWO FOR THE S-INDEX.  EACH MATRIX PRESENTS THE CALCULATIONS FOR ALL');
WRITELN('    THE COMBINATIONS OF FACTOR PAIRS POSSIBLE ACROSS THE STUDIES IN QUESTION.');
WRITELN('    THE MATRICES ARE OUTPUT TO A PRINTER CONNECTED TO THE LPT1 OUTPUT PORT.');
WRITELN(' ');
WRITELN('                         *** PRESS <ENTER> TO CONTINUE ***');
READLN;
FOR A :=1 TO 2 DO WRITELN;
 REPEAT
  DONE :=true;
  WRITE('ENTER FACTOR ID FOR MATRIX ONE (ONE CHARACTER) : ');
  READLN(VARIABLE);
  WRITE('ENTER FACTOR ID FOR MATRIX TWO (ONE CHARACTER) : ');
  READLN(FACTOR);
  REPEAT
   WRITE('ENTER NAME OF MATRIX ONE :'); READLN(FILENAME);
   BAD_FILE :=FALSE;
   A :=ORD(FILENAME.LEN);
   VALID_CHAR :=FALSE;
   FOR B :=1 TO A DO
    BEGIN
     IF ((ORD(FILENAME[B]) > 64) AND (ORD(FILENAME[B]) < 91)) OR
        ((ORD(FILENAME[B]) >  96) AND (ORD(FILENAME[B]) < 123)) THEN
     VALID_CHAR :=TRUE;
     IF NOT VALID_CHAR THEN BAD_FILE :=TRUE;
     VALID_CHAR :=FALSE;
    END;

   IF BAD_FILE THEN WRITELN('Invalid file name (No special characters) : ',FILENAME);
   IF A > 8 THEN
    BEGIN
     WRITELN('Invalid file name (File name too long. 8 Characters maximum.) : ',FILENAME);
     BAD_FILE :=TRUE;
    END;

    IF A < 1 THEN
     BEGIN
      WRITELN('Invalid file name (file name too small. 1 Character minimum) : ',filename);
      BAD_FILE :=TRUE;
     END;

  UNTIL NOT BAD_FILE;
  NAME_ONE :=FILENAME;

  REPEAT
   WRITE('ENTER NAME OF MATRIX TWO :'); READLN(FILENAME);
   BAD_FILE :=FALSE;
   A :=ORD(FILENAME.LEN);
   VALID_CHAR :=FALSE;
   FOR B :=1 TO A DO
    BEGIN
     IF ((ORD(FILENAME[B]) > 64) AND (ORD(FILENAME[B]) < 91)) OR
        ((ORD(FILENAME[B]) >  96) AND (ORD(FILENAME[B]) < 123)) THEN
     VALID_CHAR :=TRUE;
     IF NOT VALID_CHAR THEN BAD_FILE :=TRUE;
     VALID_CHAR :=FALSE;
    END;

   IF BAD_FILE THEN WRITELN('Invalid file name (No special characters) : ',FILENAME);
   IF A > 8 THEN
    BEGIN
```

```
      WRITELN('Invalid file name (File name too long, 8 Characters maximum.) : ',FILENAME);
      BAD_FILE :='TRUE;
    END;

    IF A < 1 THEN
      BEGIN
        WRITELN('Invalid file name (file name too small, 1 Character minimum) : ',filename);
        BAD_FILE :='TRUE;
      END;

  UNTIL NOT BAD_FILE;
  NAME_TWO :='FILENAME;

  ASSIGN (IN1, NAME_ONE);
  ASSIGN (IN2, NAME_TWO);
  IN1.MODE :='SEQUENTIAL;
  IN1.TRAP :='TRUE;
  IN2.MODE :='SEQUENTIAL;
  IN2.TRAP :='TRUE;
  RESET(IN1);
  RESET(IN2);
   IF (IN2.ERRS ='10) OR (IN1.ERRS ='10) THEN
    BEGIN
      WRITELN('FILE(S) NOT FOUND : ');
      REPEAT
        WRITE('ABORT RETRIVEAL ='(A), OR RETRY RETRIVEAL ='(R)'); READLN(IN_CHAR);
      UNTIL (IN_CHAR =''A') OR (IN_CHAR =''a') OR (IN_CHAR =''R') OR (IN_CHAR =''r');
      IF (IN_CHAR =''R') OR (IN_CHAR =''r') THEN DONE :='FALSE;
      IN1.ERRS :='0;
      IN2.ERRS :='0;
     END;

  UNTIL DONE;
   IF (IN_CHAR =''A') OR (IN_CHAR =''a') THEN
    DONE :='false;
   if DONE then
  BEGIN

A :='1;
   NO_ROWS1 :='0; NO_COLUMNS1 :='0;
   WHILE NOT EOF(IN1) DO
   BEGIN
  B :='1;
  READ(IN1, VAR_X);
  WHILE NOT EOLN(IN1) DO
BEGIN
        CASES[A,B].STUDY1 :='VAR_X;
        B :='B + 1;
        READ(IN1,VAR_X);
END;
  CASES[A,B].STUDY1 :='VAR_X;
     A :='A + 1;
     READLN(IN1);
   END;
NO_ROWS1    :='A - 1;
NO_COLUMNS1 :='B;
   writeln('NO OF ROWS FOR STUDY 1 ='',NO_ROWS1:2,'   NO OF COLUMNS FOR STUDY 1 ='',NO_COLUMNS1:2);
A :='1;
   NO_ROWS2 :='0; NO_COLUMNS2 :='0;

   WHILE NOT EOF(IN2) DO
   BEGIN
  B :='1;
     READ(IN2, VAR_X);
  WHILE NOT EOLN(IN2) DO
BEGIN
```

```
          CASES[A,B].STUDY2 := VAR_X;
          B := B + 1;
          READ(IN2,VAR_X);
    END;
       CASES[A,B].STUDY2 := VAR_X;
         A := A + 1;
         READLN(IN2);
       END;
    NO_ROWS2    := A - 1;
    NO_COLUMNS2 := B;
       writeln('NO OF ROWS FOR STUDY 2 =',NO_ROWS2:2,'   NO OF COLUMNS FOR STUDY 2 =',NO_COLUMNS2:2);

    CLOSE(IN1);
    CLOSE(IN2);

    END;        {END IF OK WITH FILE

    FOR A := 1 TO NO_COLUMNS1 DO
      BEGIN
        FOR B := 1 TO NO_COLUMNS2 DO
          BEGIN
            SUM[A,B] := 0.0;
            FOR C := 1 TO NO_ROWS2 DO
              BEGIN
                HOLD_SQR := 0.00;
!               WRITELN('STUDY1 =',CASES[C,A].STUDY1:10:7,'  STUDY2=',CASES[C,B].STUDY2:10:7);
                HOLD_SQR := SQR(CASES[C,A].STUDY1 - CASES[C,B].STUDY2);
!               WRITELN(OUTPUT,'HOLD SQR =FOR C =',C:2,'  ',HOLD_SQR:12:10);
                SUM[A,B] := HOLD_SQR + SUM[A,B];
              END;
!           WRITELN('SUM =',SUM[A,B]:9:2);
            RMS_TBL[A,B] := SQRT(SUM[A,B]/ NO_ROWS2);
!            writeln(output,' RMS = ',rms_tbl[a,b]:9:5);
!            READLN(VAR_X);
          END;
      END;


    FOR A := 1 TO NO_COLUMNS1 DO
      BEGIN
        FOR B := 1 TO NO_COLUMNS2 DO
          BEGIN
            SUM[A,B] := 0.0;
            SUM_STUDY1 := 0.00;
            SUM_STUDY2 := 0.00;

            FOR C := 1 TQ NO_ROWS2 DO
              BEGIN
                HOLD_SQR := 0.00;
                SUM_STUDY1 := SUM_STUDY1 + (CASES[C,A].STUDY1 * CASES[C,A].STUDY1);
                SUM_STUDY2 := SUM_STUDY2 + (CASES[C,B].STUDY2 * CASES[C,B].STUDY2);
!               WRITELN('STUDY1 =',CASES[C,A].STUDY1:10:7,'  STUDY2=',CASES[C,B].STUDY2:10:7);
                HOLD_IT := CASES[C,A].STUDY1 * CASES[C,B].STUDY2;
!               WRITELN(OUTPUT,'HOLD IT  =FOR C =',C:2,'  ',HOLD_IT:12:10);
                SUM[A,B] := HOLD_IT + SUM[A,B];
              END;

!           WRITELN('SUM =',SUM[A,B]:9:2);
            CC_TBL[A,B] := SUM[A,B]/ SQRT(SUM_STUDY1 * SUM_STUDY2);
!           writeln(output,' CC = ',CC_tbl[a,b]:9:5);
!           READLN(VAR_X);
          END;
```

```
END;

ASSIGN(PRINTER,'LPT1:');
REWRITE(PRINTER);
FOR A :=1 TO NO_COLUMNS1 DO
  BEGIN
    WRITELN(PRINTER,'A =',A:2);
    FOR B :=1 TO NO_COLUMNS2 DO
      BEGIN
        WRITELN(PRINTER,'B =',B:2);
        FOR X :=1 TO 3 DO
          BEGIN
            FOR Y :=1 TO 3 DO
              BEGIN
                CT_TBL[Y,X]^:=0;
              END;
          END;

        FOR C :=1 TO NO_ROWS2 DO
          BEGIN
            WRITELN(OUTPUT,'C =',C:2);
            IF CASES[C,A].STUDY1 > 0.3 THEN
              HOLD1 :=1
            ELSE
            IF CASES[C,A].STUDY1 < -0.3 THEN
              HOLD1 :=3
            ELSE
              HOLD1 :=2;

            IF CASES[C,B].STUDY2 > 0.3 THEN
              HOLD2 :=1
            ELSE
            IF CASES[C,B].STUDY2 < -0.3 THEN
              HOLD2 :=3
            ELSE
              HOLD2 :=2;
            CT_TBL[HOLD1, HOLD2]^:=CT_TBL[HOLD1, HOLD2]^+ 1;
            WRITELN(OUTPUT,' CT TBL =',CT_TBL[HOLD1, HOLD2]:2);
            WRITELN(OUTPUT,' S 1 ',CASES[C,A].STUDY1:9:5, ' S 2 =',CASES[C,B].STUDY2:9:5);
          END;
        TOTAL :=0;
        FOR VAR X :=1 TO 3 DO
          BEGIN
          FOR VAR Y :=1 TO 3 DO
            BEGIN
              TOTAL :=TOTAL + CT_TBL[X,Y];
            END;
          END;
          WRITELN(OUTPUT,'TOTAL =',TOTAL:2);
        IF (NOT((CT_TBL[1,1]^+ CT_TBL[3,3]^- CT_TBL[1,3]) + (0.5*(CT_TBL[1,1]^+ CT_TBL[3,3]^- CT_TBL[1,3]^- CT_TBL[3,1]))) =0.00);
        THEN
          BEGIN
          TOP :=(CT_TBL[1,1]^+ CT_TBL[3,3]^- CT_TBL[1,3]^- CT_TBL[3,1]);
          BOTTOM :=((CT_TBL[1,1]^+ CT_TBL[3,3]^+ CT_TBL[1,3]^+ CT_TBL[3,1]) + (0.5*(CT_TBL[1,2]^+ CT_TBL[2,1]^+
                    CT_TBL[2,3]^+ CT_TBL[3,2])));
          WRITELN(PRINTER,'TOP =',TOP:9, 'BOTTOM =',BOTTOM:9:4);
          S_INDEX[A,B].S :=TOP / BOTTOM;
          S_INDEX[A,B].HYCOUNT :=
          CT_TBL[1,2]^+ CT_TBL[2,1]^+ CT_TBL[2,2]^+ CT_TBL[2,3]^+ CT_TBL[3,2];
          WRITELN(PRINTER, 'S INDEX =',S_INDEX[A,B].S:10:7, 'HY COUNT =',S_INDEX[A,B].HYCOUNT:2);
        END;
      END;
  END;
CLOSE(PRINTER);
```

```
ASSIGN(PRINTER,'LPT1:');
REWRITE(PRINTER);
WRITELN(PRINTER,'                    FACTOR COMPARISON USING RMS');
WRITELN(PRINTER);
WRITELN(PRINTER,'        ',FACTOR:1,'1','        ',FACTOR:1,'2','        ',FACTOR:1,'3        ',FACTOR:1,'4',
        '        ',FACTOR:1,'5','        ',FACTOR:1,'6        ',FACTOR:1,'7        ',FACTOR:1,'8        ');

WRITELN(PRINTER);
C :=1;
FOR VAR A :=1 TO NO_COLUMNS2 DO
  BEGIN
    WRITE(PRINTER,VARIABLE:1,C:2);
    FOR VAR B :=1 TO NO_COLUMNS2 DO
      BEGIN
        WRITE(PRINTER,'  ',RMS_TBL[A,B]:6:3);
      END;
    WRITELN(PRINTER);
    C :=C + 1;
    WRITELN(PRINTER);
  END;
PAGE(PRINTER);
CLOSE(PRINTER);


ASSIGN(PRINTER,'LPT1:');
REWRITE(PRINTER);
WRITELN(PRINTER,'                    FACTOR COMPARISON USING CC');
WRITELN(PRINTER);
REWRITE(PRINTER);
WRITELN(PRINTER,'        ',FACTOR:1,'1','        ',FACTOR:1,'2','        ',FACTOR:1,'3        ',FACTOR:1,'4',
        '        ',FACTOR:1,'5','        ',FACTOR:1,'6        ',FACTOR:1,'7        ',FACTOR:1,'8        ');

WRITELN(PRINTER);
C :=1;
FOR VAR A :=1 TO NO_COLUMNS2 DO
  BEGIN
    WRITE(PRINTER,VARIABLE:1,C:2);
    FOR VAR B :=1 TO NO_COLUMNS2 DO
      BEGIN
        WRITE(PRINTER,'  ',CC_TBL[A,B]:6:3);
      END;
    WRITELN(PRINTER);
    C :=C + 1;
    WRITELN(PRINTER);
  END;
PAGE(PRINTER);
CLOSE(PRINTER);


ASSIGN(PRINTER,'LPT1:');
REWRITE(PRINTER);
WRITELN(PRINTER,'                    FACTOR COMPARISON USING S-INDEX');
WRITELN(PRINTER);
WRITELN(PRINTER,'        ',FACTOR:1,'1','        ',FACTOR:1,'2','        ',FACTOR:1,'3        ',FACTOR:1,'4',
        '        ',FACTOR:1,'5','        ',FACTOR:1,'6        ',FACTOR:1,'7        ',FACTOR:1,'8        ');

WRITELN(PRINTER);
C :=1;
FOR VAR A :=1 TO NO_COLUMNS2 DO
  BEGIN
    WRITE(PRINTER,VARIABLE:1,C:2);
    FOR VAR B :=1 TO NO_COLUMNS2 DO
```

```
        BEGIN
          WRITE(PRINTER,'  ',S_INDEX[A,B].S:6:3);
        END;
      WRITELN(PRINTER);
      C :=C + 1;
      WRITELN(PRINTER);
    END;
  PAGE(PRINTER);
  CLOSE(PRINTER);

  ASSIGN(PRINTER,'LPT1:');
  REWRITE(PRINTER);
  WRITELN(PRINTER,'                HY COUNT FOR S INDEX          ');
  WRITELN(PRINTER);
  WRITELN(PRINTER,'          ',FACTOR:1,'1','        ',FACTOR:1,'2','          ',FACTOR:1,'3        ',FACTOR:1,'4',
          '        ',FACTOR:1,'5','        ',FACTOR:1,'6        ',FACTOR:1,'7        ',FACTOR:1,'8        ');

  WRITELN(PRINTER);
  C :=1;
  FOR A :=1 TO NO_COLUMNS2 DO
    BEGIN
      WRITE(PRINTER,VARIABLE:1,C:2);
      FOR B :=1 TO NO_COLUMNS2 DO
        BEGIN
          WRITE(PRINTER,'  ',S_INDEX[A,B].HYCOUNT:6);
        END;
      WRITELN(PRINTER);
      C :=C + 1;
      WRITELN(PRINTER);
    END;
  PAGE(PRINTER);
  CLOSE(PRINTER);

  (*
  (THIS BLOCK OF CODE WILL PRINT OUT THE MATRIX THAT CONTAINS THE TWO INPUT DATA MATRICES
  FOR VAR A :=1 TO NO_ROWS2 DO
  BEGIN
   WRITE('A =',A:2);
  FOR VAR B :=1 TO NO_COLUMNS2 DO
  BEGIN
   WRITELN(OUTPUT,'B =',B);
   WRITELN(CASES[A,B].STUDY1:9:5,'   STUDY 2 =',CASES[A,B].STUDY2:9:5);
  END;
  WRITELN;
  END; *)

  END.
```

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