

MULTIGROUP-MULTIWAVES LISREL MODELING IN TOURIST SATISFACTION ANALYSIS¹

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1. INTRODUCTION

The main aims of tourist managers and policy makers are both understanding the patterns of tourist decision making process and identifying the aspects that influence tourist loyalty. In this context, the relationship between the overall satisfaction for a destination and tourist loyalty is a crucial factor that enables managers to develop strategies that increase the attraction of the destination (Baker and Crompton, 2000; Kozak and Rimmington, 2000; Um et al., 2006; Chen and Tsai, 2007; Castro et al., 2007; Konecnik and Gartner, 2007). Despite the abundance of studies in this area, there is a little consideration of how satisfaction evaluations are affected by tourists characteristics and market heterogeneity and if they change over time and involve the Tourist Local System (TLS).

The advantages of considering these aspects are relevant for the destination management. Differentiating tourists and classifying them into groups can be useful to understand the individual behaviour and to determine the appropriate products, resources and communications strategies to be addressed to various segments. Destination managers are also interested in investigating if factors that influence tourist satisfaction change over time in order to continuously adequate their strategies to tourist needs. Moreover, considering a destination as a TLS allows to evaluate the global quality of a visitor experience, which depends not only on the appeal of the primary attractions but also on the quality and on the efficiency of complementary businesses such as hotels, restaurants, shopping, environment facilities, information (Bernini, 2006).

The paper attempts to answer to the following questions: does satisfaction toward TLS differ among groups of tourists segmented with respect to travel characteristics? Does tourists' evaluations change over time? In this context, the dynamic analysis of Customer Satisfaction turns out to be useful for monitoring TLS satisfaction both over time and among different tourist segments. We pro-

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pose to investigate these hypotheses by applying a Multigroup-Multiwaves analysis implemented in Lisrel (Jöreskog and Sörbom, 1988). This technique is used to compare groups that are assumed to be independent and random sampled from heterogeneous populations. The comparison is performed by constraining some parameters of a Lisrel model to be equal among groups of tourists and over time, in such a way that nested degrees of invariance can be tested. The data set analyzed has been collected by the Faculty of Statistics – University of Bologna – within the Tourist Satisfaction Survey whose aim is measuring trip motivation, TLS evaluations and judgments of tourists hosting in Rimini during the period 2004-2006.

The study provides three significant contributions in this field of research. First, it explores the influence of tourists segmented according to holiday motivation (seaside, conference, sport) on the Overall Satisfaction of a destination. The concept of tourist segmentation has received large attention in the tourism literature but it is mainly concentrated on tourist characteristics, such as socio-demographic-psychological and decision-making style (Becken and Gnoth, 2004; Decrop and Snelders, 2005; Alvarez and Asugman, 2006; Mehmetoglu, 2007). Secondly, it evaluates the overall satisfaction toward a destination. Generally tourism literature focuses on elements of the destination, such as the image, brand, attractiveness and facilities (Kozak and Rimmington, 2000; Kozak, 2001; Um et al, 2006; Chen and Tsai, 2007; Konecnik and Gartner, 2007; Castro et al., 2007); conversely, in the analysis we consider the combination of products and services (accommodation, leisure services, environment, location) experienced by tourists during their holiday (Kozak and Rimmington, 1999). Finally, it extends the classical Lisrel model applied in the tourism field of research using a Multigroup-Multiwaves approach. Indeed it is well known that Customer Satisfaction is a latent construct and it is typically investigated by using latent variable models. The Multigroup-Multiwaves analysis allows to simultaneously investigate the presence of different TLS evaluation schemes among groups of tourists at the same time and over time. Typically multi-sample analysis is used to assess if the same Lisrel model fits data from different samples with some or all parameters constrained to be equal over groups. The analysis can regard either different groups at the same time (Multigroup analysis) or the same group in different occasions (Multiwaves analysis). It can be viewed as a temporal analysis within the Lisrel framework or both of them (Multigroup-Multiwaves analysis) as we do in our study.

The paper is organized as follows. In section 2 both a literature review and the conceptual model that underlies the research are presented. Then, data collection and some related descriptive analysis are illustrated. The methodology of the study, with particular emphasis on the Multigroup-Multiwaves analysis, is discussed in Section 4. Finally, the results of the study are presented in Section 5. Conclusions and future lines of research on this topic conclude the paper.

2. THEORETICAL FRAMEWORK

Developments in international tourism and travel have increased competitiveness among tourist destinations. This implies the local management has to develop tourism supply strategies in order to satisfy the needs of tourists. In this field of research, the tourism literature stresses that the primary managerial criterion for success should be defined in terms of level of the tourist satisfaction. There is a causal link between quality of a tourism supplier performance, level of consumer satisfaction, and the success of the destination. Higher quality of performance and levels of satisfaction are perceived to result in increased loyalty and future visitation, greater tolerance of price increases, and an enhanced reputation. In repeat visitation analysis, the major stream of research tries to relate satisfaction construct and antecedents. Revisit intention has been regarded as a consequence of a tourist satisfaction model and destination loyalty has been interpreted as an extension of satisfaction rather than as an initiator of the revisit decision-making process. A substantial literature discusses the relative impact of tourist satisfaction on subsequent behavior, demonstrating that there is a significant relationship among tourist satisfaction, loyalty and intention to return (Baker and Crompton, 2000; Kozak and Rimmington, 2000; Um et al, 2006; Castro et al, 2007; Chen and Tsai, 2007; Konecnik and Gartner, 2007). This means that favourable tourist perceptions and satisfaction are potentially an important source of competitive advantage for tourist destinations.

Tourist segmentation can also help destinations to both manage their resources and design policy. Differencing tourists and classifying them into groups has been found useful for understanding the individual behaviour and for determining the appropriate products and communication strategies to be addressed to the various segment. Since different types of individuals show diverse requirements, understanding the characteristics of tourists will help local authorities to evaluate the competitiveness of the destination in meeting their needs. Accordingly, decisions related to infrastructure, resource allocation and planning for services and accommodation in a destination depend on the types of individuals who visit it. With this respect, linking the segments to specific products is important for policy makers and managers. In the tourism literature a large number of typologies of vacationers, tourists and travellers has been proposed. Many of these typologies are based on segmentation criteria, which have been proposed to sub-divide vacationers into homogeneous groups, in order to help targeting and positioning strategies. These criteria use demographic variables (age, family life cycle), behavioural variables (amount of expenditure, chosen destination, distance travelled and frequency of travel) and socio-psychological variable (vacationer predispositions, values and lifestyles, attitudes, interests and opinions, motives, or personality types) (Becken and Gnoth, 2004; Decrop and Snelders, 2005; Alvarez and Asugman, 2006; Mehmetoglu, 2007). Although some authors have identified certain segmenting variables that can be linked to both customer satisfaction and future behaviour such studies are relatively rare. Similarly, in literature there is a limited evidence that supports the notion that customer heterogeneity affects the na-

ture of relationships between overall satisfaction and destination. Otherwise, it is important to investigate if the evaluation scheme is the same for all tourists or if tourists express different satisfaction with respect to some characteristics. In particular, our interest is on the relation between *a priori* segmentation of tourists, based on both their trip motivation (attending a conference, participating to a sport event, spending a seaside holiday), and their evaluation scheme toward the tourist destination where they spent holiday.

Another important issue for policy and managers concerns the aspects of the destination to be evaluated. A destination is a package of tourism facilities and services, which is composed of a number of multi attributes that together determine its attractiveness for a particular tourist in a given travel situation. Consequently, the overall satisfaction of a tourist destination is the result of the evaluation of various experiences and the importance of each component in the overall impression. In this framework, tourist satisfaction can be measured by a multi-item scale, referring to the sum of tourist evaluation of each destination attribute such as natural environment, physical attractions, accommodation, restaurants, shops, cultural events, heritage, and so on (Kozak and Rimmington, 1999 and 2000).

This framework of analysis reflects the Italian national legislation reform on tourism. It defines the Tourism Local System (TLS) as “homogeneous or integrated destinations, also concerning areas which belong to different regions, characterized either by an integrated supply of cultural and environmental goods and tourism entertainments, including typical agriculture products and local arts and crafts, or by a wide presence of single or cooperating tourism enterprises” (Law n.135, 2001). The tourism product is indeed a global product, whose creation either the tourism enterprises (hotels and restaurants) or firms and institutions contribute. Then TLS refers to the hospitable function of the tourism destinations, through all supplied coordination factors, such as receptive organizations and services, transports network, natural, historical and artistic resources, local institutions and everything that establishes the quality of life and relations of a place (Bernini, 2006). Accordingly, we propose to empirically measure the overall satisfaction of a TLS by a combination of many attribute variables.

The most difficult issue in integrating satisfaction into TLS evaluation is how to operationalize the concepts presented above. There is a vigorous debate on the conceptualization of the performance quality and satisfaction constructs, and the nature of their interrelationships. In this paper, we propose a conceptual model which leads to the identification of the determinants of the tourist satisfaction. The model extends and integrates previous research streams on tourism field by assuming that tourist Overall Satisfaction toward a TLS is determined by three main attributes: Accommodation, Leisure services and Local environment. They are separated constructs we suppose to change both over time and among tourists, classified *a priori* with respect to travel typologies: attending a conference, participating to a sport event, spending a seaside holiday (Figure 1).

The relationships among the constructs can be listed in the following hypotheses:

- H_1 : Different aspects of TLS satisfaction - Accommodation, Leisure service and Local environment - influence the level of the Overall Satisfaction: the greater the extent of satisfaction with Accommodation, Leisure service and Local environment, the higher the level of Overall Satisfaction;
- H_2 : Invariance of the satisfaction structure over time: the influence of Accommodation, Leisure service and Local environment on the Overall Satisfaction does not change over time
- H_3 : Invariance of the satisfaction structure among tourist segments: the influence of Accommodation, Leisure service and Local environment on the Overall Satisfaction does not change among tourists segmented by trip motivation.

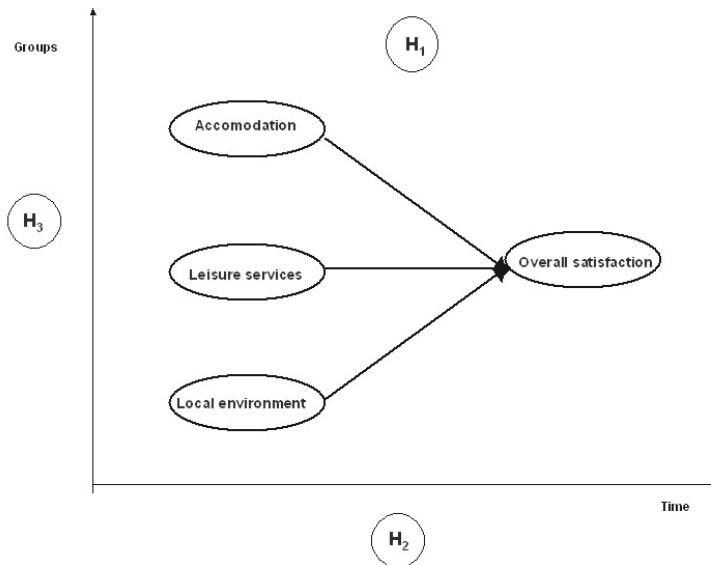


Figura 1 – Path diagram of the conceptual model.

Testing these hypotheses contributes to better understand the relation between tourist destination and overall satisfaction, investigating if individuals differ according to their evaluation scheme of the TLS destination with respect to both their trip motivation and over time.

3. DATA DESCRIPTION

Since 2002 Marketing Tourist Public Agency, Convention Bureau and Chamber of Commerce have been carrying out a yearly survey to evaluate habits and satisfaction of tourists towards the Tourism Local System in Rimini. The Faculty of Statistical Sciences of Bologna University has been involved in the sampling design, in the questionnaire building and in the interview procedures of the survey. In the following, we present the main features of the survey.

3.1. *The data collection procedure*

The population of interest consists of tourists who chose the province of Rimini for different reasons: attending a conference, participating to a sport event, spending a seaside holiday. The sampling design is based on a stratification with respect to trip motivations (sea, sport and conference), destinations (Rimini, Riccione, Cattolica, Misano, Bellaria and Igea Marina) and period of the year (month). Almost two thousands questionnaires were administered to tourists, randomly chosen, by means of a "face to face" technique on the place where they spent their holiday (seaside, convention centre, sport centre, around city). The surveys were conducted continuously during the year.

3.2. *The questionnaire*

The questionnaire is composed of four main sections: "Motivation", "Judgments", "Habits" and "Personal data". All the items were administered to all the respondents a part from some questions specific of tourist typology.

The first question concerns the "Motivation" of travel: attending a conference, participating to a sport event, spending a seaside holiday. This question allows to both identify different segments of tourists and diversify the interview with respect to some aspects of holiday.

The second part of the questionnaire includes several items regarding the "Judgment" of the TLS. They concern various aspects of destination: accommodation, leisure services, environment, tourist information and location (beach, convention centre and sportive system attributes, respectively). Tourists are required to give a score (Likert-scale 1-10) to each item related to each single aspect of the TLS, expressed in terms of satisfaction and importance. Moreover, global satisfaction evaluations related to infrastructure, welcome and specific segment supply (conference, sport and sea) are requested. They are also asked to express the judge about the expectation toward their holiday and the worse and the best aspect of the holiday.

The "Habits" section allows to obtain information about the holiday characteristics such as trip transport, hotel typology, number of days of vacation, whom you spent the holiday. In the "Personal data" section we collect information on age, gender, nationality, residence and occupation.

3.3. *Data description*

Table 1 summarizes the variables used in the analysis, their operationalization, and their mean values for the samples in 2004, 2005 and 2006 respectively. Years 2002 and 2003 have not been considered since the structure of the questionnaire is quite different from the other years and hence the results are not comparable.

TABLE 1
Items descriptions and mean values (years 2004, 2005, 2006)

Item	Operationalization	Sea			Conference			Sport		
		2004	2005	2006	2004	2005	2006	2004	2005	2006
Accommodation:										
Room	Room cleaning, linen, etc	7.33	7.92	7.73	7.97	7.89	8.17	7.52	7.55	7.85
Services	Hotel services: common rooms, acceptance	7.58	7.72	7.57	7.35	7.78	7.96	7.09	7.30	7.72
Restaurant	Restorant inside the hotel	7.72	7.95	7.68	7.67	7.83	7.02	7.50	7.28	7.34
Environment:										
Road	Practicability and traffic	6.79	6.78	6.63	7.07	6.66	6.86	5.60	6.40	6.83
Safety	Security and tranquillity of the city	7.61	7.96	7.60	8.18	7.60	7.67	6.93	7.38	7.36
Silence	Quietness	6.79	6.83	6.90	7.60	5.89	7.23	6.07	6.31	6.82
Green	Cleaning and maintenance of roads, green areas and city	7.87	7.81	7.57	7.86	7.49	7.55	6.92	7.08	7.34
Park	Car parking	5.59	6.17	6.28	7.35	6.43	6.76	5.58	5.54	6.70
Leisure:										
Shopping	Boutique, markets, Stores, trade centers, etc	8.04	8.02	7.85	7.01	6.91	7.79	7.56	7.92	8.01
Enjoy	Thematic Parks, discotheques, pub, etc	8.57	8.20	8.09	7.23	7.00	7.96	8.29	8.25	8.49
Info	Information on the city and the territory: guides, events, timetables, transports and offices information	7.35	7.56	7.53	7.76	7.60	8.08	7.38	7.58	7.85
Restaurant	Restorant	7.19	8.10	8.08	7.75	7.95	8.03	8.11	8.19	8.30
Global evaluation:										
Welcome	Welcome and hospitality	7.15	8.22	8.12	8.45	8.28	8.52	8.15	7.98	8.41
Infra	Infrastructures of the city	7.40	7.93	7.88	7.93	7.79	7.84	7.35	7.36	7.83
Supply	Specific segment supply (sea, conference, sport)	7.89	8.19	7.94	8.15	7.98	8.20	7.74	7.64	8.07
Sample size		7.15	8.22	8.12	8.45	8.28	8.52	8.15	7.98	8.41

We can notice that the average level of satisfaction is quite high, ranging from 7 to 8 for almost all the items and in all the cases considered. Just the items Road, Silence and Park present smaller mean values (from 6 to 7). Moreover, the means seem not to change relevantly among groups and over time.

The analysis of the Global Satisfaction Index (*GSI*), calculated for each year as the average of the satisfaction scores given by the respondents to infrastructure, welcome and specific segment supply, shows a progressive increase of more than two points per cent every year (Figure 2). As regard tourist segments, conference attendees and sport tourists show a positive trend in the *GSI*; conversely *GSI* for seaside tourists declines over time probably due to the life cycle phase of this tourist segment (maturity).

The Tourist Satisfaction Index (*TSI*) is calculated as the average of the satisfaction scores on the overall respondents per year and for three aspects of the *TLIS*: welcome, infrastructure and specific segment supply (Figure 3). The *TSI* always shows a positive trend, particularly for welcome which increases more than three points per cent per year. Welcome in Rimini is also the most satisfying aspect of the destination: in 2006 the *TSI* reaches value 8.29. Tourists evaluation towards infrastructure is relevant and increasing over time last year: in 2006 the *TSI* is 7.86 (the 4% more than 2004).

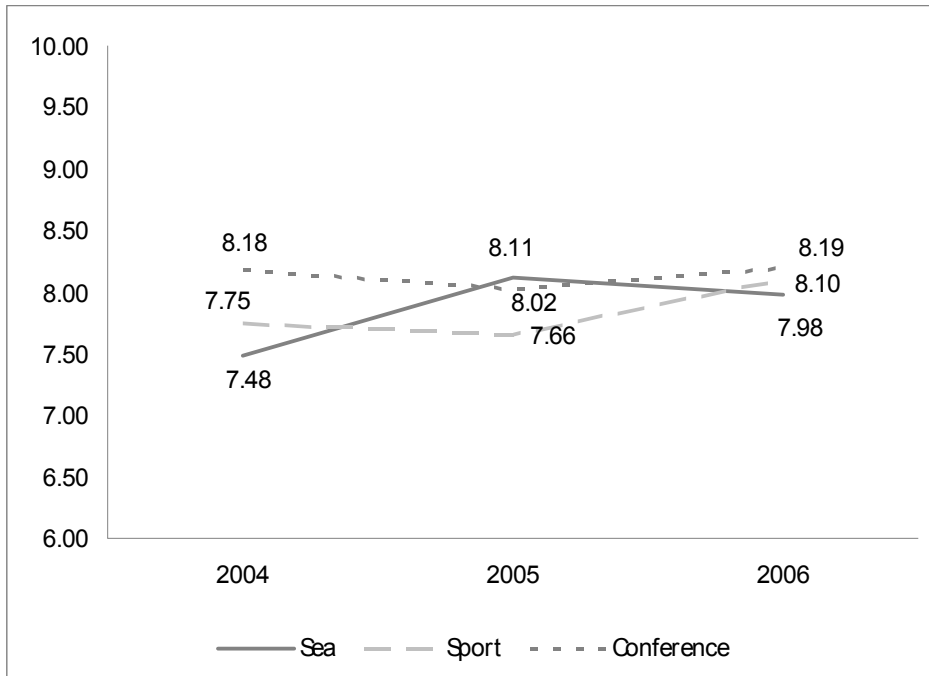


Figure 2 – Global Tourist Satisfaction Dynamics over time.

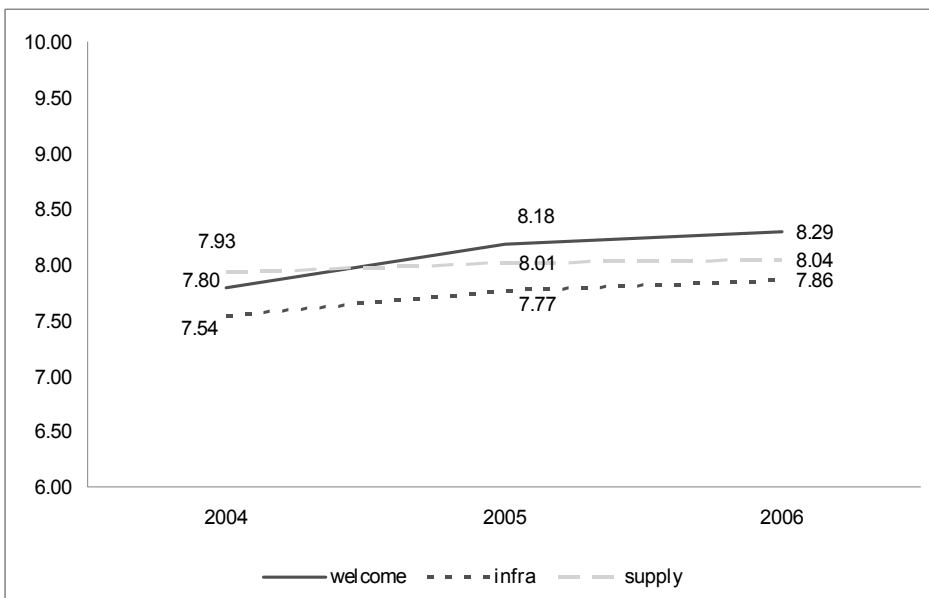


Figure 3 – Tourist Satisfaction Dynamics with respect to different aspects of the TLS.

The descriptive analysis gives some preliminary indications about the change in tourist satisfaction among segments and over time. Now the interest is focused on the following questions: does satisfaction toward *TLS* differ among groups of tourists segmented with respect to travel characteristics? Does tourists' evaluations change over time? To answer to these questions we specify and estimate a LISREL Multigroup-Multiwaves model.

4. THE CONCEPTUAL MODEL

Customer Satisfaction is a concept not observable, therefore not directly measurable. However it can be evaluated throughout a set of indicators causally related to the underlying construct. The relationship between observed indicators/variables and the constructs of interest can be formalized within a theoretical framework that allows to obtain a correct definition and hence a precise evaluation of Customer Satisfaction and, in our particular case, of Tourism Satisfaction. In more detail we refer to the well-known Structural equation modelling approach. It is one of the most important multivariate technique for analyzing behavioural data when the constructs of interest are non directly observable or not measurable, namely, they are latent variables. Indeed it represents a powerful generalization of statistical approaches belonging to two different traditions, the psychometric one and the econometric one.

4.1 *The Lisrel model*

The two constitutive parts of structural equation models are (i) the factor analysis from the psychometric field and (ii) the causal models and the path analysis from econometrics. In such a way direct and indirect effects between latent variables are formalized and investigated in a common model. The model, often indicated as *LISREL* (Linear Structural Relationship) model, gives the name to a software (Jöreskog and Sörbom, 1988) but it is also referred to as a general procedure for structural equation modelling.

The psychometric part is represented by the measurement models that indicate how the latent variables are measured by the manifest variables and allows to determine the characteristics of this measurement. On the other hand the econometric part is represented by a structural equation model that specifies, if they exist, the causal relations among the latent variables and allows to determine the causal effects and to assign the explained and unexplained variances.

The structural model is given by the following expression:

$$\boldsymbol{\eta} = \mathbf{B}\boldsymbol{\eta} + \boldsymbol{\Gamma}\boldsymbol{\xi} + \boldsymbol{\zeta} \quad (1)$$

where $\boldsymbol{\eta}$ and $\boldsymbol{\xi}$ are the vectors of the latent variables of dimensions, respectively, $(k \times 1)$ and $(n \times 1)$. They are indicated with different symbols because from the econometric tradition the first one is the vector of the endogenous (dependent) variables and the second one is the vector of the exogenous (independent) vari-

ables. ζ is the vector of the random errors. \mathbf{B} and $\mathbf{\Gamma}$ are coefficient matrices in the structural relationship and the elements of these matrices are called structural coefficients or structural parameters. The specification of the structural model requires some assumptions: the independent variables and the errors are uncorrelated, $E(\zeta\zeta') = E(\xi\xi') = 0$, \mathbf{B} is not singular, that is, it is invertible and hence positive definite.

The distinction between endogenous and exogenous latent variables leads to consider two different measurement models, each of them expressing the relation between latent variables and observed variables so that there are no common indicators for the two groups of latent variables. They are specified as follows:

$$\mathbf{Y} = \mathbf{\Lambda}_y \boldsymbol{\eta} + \boldsymbol{\varepsilon} \quad (2)$$

$$\mathbf{X} = \mathbf{\Lambda}_x \boldsymbol{\xi} + \boldsymbol{\delta} \quad (3)$$

where \mathbf{X} and \mathbf{Y} are the vectors of the observed variables of dimensions, respectively, $(p \times 1)$ and $(q \times 1)$. $\mathbf{\Lambda}_x$ and $\mathbf{\Lambda}_y$ are the matrices of coefficients of the loadings of the observed variables on the latent variables and $\boldsymbol{\varepsilon}$ and $\boldsymbol{\delta}$ are the vectors of measurement errors in \mathbf{X} and \mathbf{Y} .

Also the measurement models require some assumptions that is:

$$E(\boldsymbol{\xi}\boldsymbol{\delta}') = E(\boldsymbol{\delta}\boldsymbol{\xi}') = 0, \quad E(\boldsymbol{\eta}\boldsymbol{\varepsilon}') = E(\boldsymbol{\varepsilon}\boldsymbol{\eta}') = 0, \quad E(\boldsymbol{\zeta}\boldsymbol{\varepsilon}') = 0, \quad E(\boldsymbol{\zeta}\boldsymbol{\delta}') = 0, \\ E(\boldsymbol{\varepsilon}\boldsymbol{\delta}') = 0.$$

Model estimation is based on the covariance matrix of the observed variables, $\boldsymbol{\Sigma}$, that, if the model is identified, can be expressed as a function of the model parameters. In more detail, model parameters are estimated throughout an iterative process that minimizes a proximity function, $F(\mathbf{S}, \boldsymbol{\Sigma})$, where \mathbf{S} is the observed covariance matrix. The choice of F depends on the estimation criterion chosen (Bollen, 1989). Under the normality assumption of the observed variables the most used criterion is the maximum likelihood estimation.

When the observed variables are ordinal, as in our case, we refer to the underlying variable approach. It assumes that each observed ordinal variable is generated by an underlying unobserved continuous variable assumed to be normally distributed. Major details on this approach can be found in Muthén (1984), Jöreskog and Moustaki (2001) and in Cagnone, Mignani and Gardini (2004). In the case of ordinal data the most used methods of estimation are the Weighted Least Square estimation (Browne, 1984) and the Robust Maximum Likelihood estimation (Jöreskog et. al., 2001). In this study we apply the latter.

4.2 Multigroup analysis

The analysis of the Tourist Satisfaction among different groups within the same time (segments with respect to travel characteristics) and over time requires the use of a particular Lisrel technique called multi-group analysis.

Typically the multi-group analysis is used to compare groups that are assumed to be independent and random sampled from heterogeneous populations. In other words it allows to determine if one or more grouping variables (travel characteristics and time points in our study) have any influence on the structural equation model defined for the evaluation of Tourist Satisfaction, that is we can test if the model defined holds in each group. In more rigorous terms, indicating the number of groups with G , we define the following equations:

- Structural equation model

$$\boldsymbol{\eta}^{(g)} = \mathbf{B}^{(g)}\boldsymbol{\eta}^{(g)} + \boldsymbol{\Gamma}^{(g)}\boldsymbol{\xi}^{(g)} + \boldsymbol{\zeta}^{(g)} \quad g = 1, \dots, G \tag{4}$$

- Measurement models

$$\mathbf{Y}^{(g)} = \boldsymbol{\Lambda}_y^{(g)}\boldsymbol{\eta}^{(g)} + \boldsymbol{\epsilon}^{(g)} \quad g = 1, \dots, G \tag{5}$$

$$\mathbf{X}^{(g)} = \boldsymbol{\Lambda}_x^{(g)}\boldsymbol{\xi}^{(g)} + \boldsymbol{\delta}^{(g)} \quad g = 1, \dots, G \tag{6}$$

The comparison is performed by constraining some parameters of a Lisrel model to be equal over groups. Any degree of invariance can be tested, from the one extreme where all parameters are assumed to be invariant over groups to the other extreme where there are no constraints across groups. If the former case is verified there is no heterogeneity among groups, that is they are samples from the same population.

Usually the analysis is performed by assessing the similarity among groups throughout nested constraints. A first necessary assumption is the equality of the form of the models among groups. If it is verified any parameter equalities can be evaluated. At this aim nested chi-square tests and nested measures of fit can be used. More details will be given in the analysis section.

The choice of which parameters have to be compared depends on the empirical problem. Usually, after assessing the form invariance, it can be convenient to evaluate the measurement invariance, that is $\boldsymbol{\Lambda}_y^{(1)} = \boldsymbol{\Lambda}_y^{(2)} = \dots = \boldsymbol{\Lambda}_y^{(G)}$ and $\boldsymbol{\Lambda}_x^{(1)} = \boldsymbol{\Lambda}_x^{(2)} = \dots = \boldsymbol{\Lambda}_x^{(G)}$, and then the invariance of the structural relations, that is $\boldsymbol{\Gamma}^{(1)} = \boldsymbol{\Gamma}^{(2)} = \dots = \boldsymbol{\Gamma}^{(G)}$ and $\mathbf{B}^{(1)} = \mathbf{B}^{(2)} = \dots = \mathbf{B}^{(G)}$.

To estimate all the models simultaneously, the following fitting function is minimized:

$$F = \sum_{g=1}^G \frac{n_g}{n} F_g(\mathbf{S}^{(g)}, \boldsymbol{\Sigma}^{(g)})$$

where, for ordinal data, F_g is either the weighted least square or the robust maximum likelihood fitting function.

4.2 Model evaluation

The most used statistic for the Lisrel model goodness of fit evaluation is defined as $T = (n-1)F(\mathbf{S}, \boldsymbol{\Sigma})$ where n is the sample size. It is asymptotically distributed as a χ^2 with $df = (1=2)(p+q)(p+q+1) - t$ where t is the number of the estimated parameters. The null hypothesis to be tested is that the theoretical covariance matrix $\boldsymbol{\Sigma}$ is not significantly different from the observed covariance matrix, \mathbf{S} . One drawback related to this statistic is its dependence on n , that is it is sensitive for large sample size. This can determine a rejection of the model also when its goodness of fit is good. Moreover it can be difficult to compare statistics computed on samples with different size.

For these reasons many alternative statistics have been proposed. Some in common use include the root mean squared approximation, *RMSEA* (Joreskog, 2002) defined as:

$$RMSEA = \sqrt{\frac{T - df}{df(n-1)}}$$

If $RMSEA=0$ the fit is perfect whereas it does not exist an upper bound. Usually a value less or equal to 0.08 is considered good, otherwise we can affirm that the model does not fit the data well.

Among the variety of indeces proposed in literature² (GFI, AGFI, TLI, NFI) we consider the comparative fit index (*CFI*; Bentler, 1990) since, as described below, it has been shown the reliability of its values in evaluating nested models (Byrne and Stewart, 2006). It is defined as:

$$CFI = \frac{(T_b - df_b) - (T_m - df_m)}{(T_m - df_m)}$$

where T_b is the chi square statistic for the baseline model and T_m is the chi square statistic for the estimated model. *CFI* ranges between 0 and 1 and a value 0.95 is assumed to be a cut point of acceptable fit.

In the multigroup analysis, invariance is tested by comparing goodness of fit measures of particular models with a model having additional between-group constraints. Denoting with *FI* a generic fit index the model fit differences are calculated as:

$$\Delta FI = FI_c - FI_{uc}$$

where FI_c and FI_{uc} are the values of some selected measure of fit for constrained and unconstrained model respectively. The way in which this discrepancy measure can be used for model evaluation will be described in detail in the data analysis section.

² Wide reviews of measures of overall model fit can be found in Mueller (1996) and Bollen and Long (1993).

5. THE ANALYSIS

The aim of the analysis is twofold: identifying the determinant of Tourism Satisfaction and evaluating if the system changes both over time and among groups. The theoretical hypothesis described before (Figure 1) requires to estimate a Lisrel model with one endogenous variable η ('Overall tourism satisfaction') and three exogenous variables ξ ('Accommodation', 'Leisure services', 'Local environment') that are supposed to influence η .

At this regards, a preliminary exploratory factor analysis and a reliability analysis were performed on the overall sample size in order to individuate the factors underlying the items of the questionnaire. The results of these preliminary analysis led to build the structural equation model reported in Figure 4. It seems to represent the theoretical system described before. Indeed we individuated three exogenous latent variables and one endogenous latent variables (enclosed in circles), each of them measured by a number of observed variables/items (enclosed in rectangles).

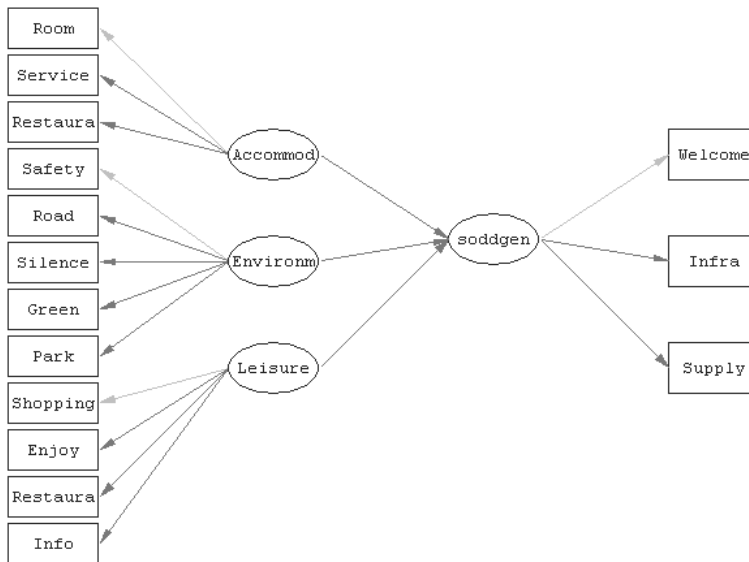


Figure 4 – Representation of the Lisrel model.

However, only a Multigroup-Multiwaves Lisrel analysis allows to confirm/disconfirm the hypothesis formulated. In more detail the theory can be verified by testing the following hierarchical hypothesis:

– H_{form} : Invariance of the form of the model. As specified before, this assumption is essential since if it does not hold it makes no sense to go further in the comparison of the parameters.

– H_{λ} : Measurement invariance assumption. We evaluate whether the coefficients linking the latent to the observed variables are the same among groups,

that is if there exists equality of scaling. In other word, we test that the latent variables have the same meaning in all the groups considered. Here we specify this hypothesis simultaneously for all the loadings, since we are interested in the invariance of the overall structure. We could also test partial measurement invariance by considering only one latent construct per time.

– $H_{\Delta\Gamma}$: Invariance of the structural relation and measurement invariance. If the measurement invariance is verified (point 2) we can test if the influence of the exogenous latent variables on the endogenous latent variable is the same among groups.

If all the hypothesis are verified we can affirm that there are no substantial differences among the groups analyzed.

The most common way to test the nested models listed above is to use the difference in their overall chi-square statistics (likelihood ratio tests) and the related degrees of freedom. However, as in the general case, also in the multigroup analysis this statistic is extremely sensitive to the sample size, as well as to moderate discrepancies of the data from normality. Thus it can become an impractical and unrealistic criterion to test hierarchical hypothesis. At this regard, Byrne and Steward (2006) define the strategy to use the $\Delta\chi^2$ for evaluating the nested hypothesis “Traditional Perspective” and propose an alternative criterion based on the *CFI* defined “Practical Perspective”. Based on previous simulation studies on the *CFI* statistic (Cheung and Rensvold, 2002), they suggest to not reject the hypothesis tested if the ΔCFI is less or equal to 0.01. Which criterion is the best is still a matter of discussion.

TABLE 2
Multigroup analysis, cross section comparison

Segment	Hypothesis	χ^2	<i>df</i>	$\Delta\chi^2$	Δdf	p-value	RMSEA	CFI	ΔCFI
2004	H_{form}	652.59	252	-	-	-	0.058	0.91	-
	H_A	791.93	274	80.23	22	0.000	0.064	0.90	0.01
	$H_{\Gamma A}$	826	280	16.48	6	0.011	0.065	0.90	0.00
2005	H_{form}	285.78	252	-	-	-	0.019	0.97	-
	H_A	323.30	274	247.99	22	0.000	0.022	0.97	0.00
	$H_{\Gamma A}$	334.36	280	12.3	6	0.056	0.023	0.97	0.00
2006	H_{form}	593.61	252	-	-	-	0.053	0.95	-
	H_A	686.85	274	83.93	22	0.000	0.055	0.95	0.00
	$H_{\Gamma A}$	711.1	280	20.95	6	0.002	0.056	0.95	0.00

In Table 2 we report the results of the analysis in the multigroup comparison. Although according to the *RMSEA* each model at each time point presents a good fit to the data, the chi-square statistic is always significant, leading to reject all the models. In the same way, comparing the three groups within each time by looking at the likelihood ratio tests, we reject all the nested hypothesis, the p-value being always very small. On the other hand, if we look at the ΔCFI they all less or equal to 0.01. Thus, according to criterion proposed by Byrne and Steward, we can conclude that for the three groups, Sea, Sport and Conference there exists form, measurement and structural invariance.

In Table 3 we report the results of the Multiwave analysis, that is we compare

each group over time. The situation is analogous to the multigroup analysis. According to the likelihood ratio we always reject the hypothesis tested. On the contrary, according to the ΔCFI we do not reject the hypothesis in every condition of the study.

TABLE 3
Multivave analysis, temporal comparison

Segment	Hypothesis	χ^2	df	$\Delta\chi^2$	Δdf	p-value	RMSEA	CFI	ΔCFI
Sea	H_{form}	564.87	252	-	-	-	0.042	0.97	-
	H_{Λ}	645.10	274	70.31	22	0.000	0.044	0.96	0.01
	$H_{\Gamma\Lambda}$	661.58	280	13.1	6	0.042	0.044	0.96	0.00
Sport	H_{form}	757.64	252	-	-	-	0.077	0.91	-
	H_{Λ}	929.74	274	172.10	22	0.000	0.085	0.90	0.01
	$H_{\Gamma\Lambda}$	942.85	280	13.11	6	0.004	0.085	0.90	0.00
Conference	H_{form}	791.25	252	-	-	-	0.073	0.95	-
	H_{Λ}	875.18	274	139.34	22	0.000	0.074	0.95	0.00
	$H_{\Gamma\Lambda}$	896.13	280	34.37	6	0.000	0.074	0.95	0.00

Even if there is not an objective way to rely either to the “Traditional Perspective” or to the “Practical Perspective” our theoretical hypothesis and the descriptive analysis suggest to follow the latter, that is there are no substantive differences in terms of satisfaction within the same kind of groups across time and among different groups at the same time. This result finds a confirmation also in the values of the parameters of the matrix Γ (Table 4).

TABLE 4
Structural parameter estimation

Segments		Γ_{2004}	Γ_{2005}	Γ_{2006}	Γ^*
Sea	Accommodation	0.32	0.23	0.33	0.30
	Leisure	0.53	0.22	0.26	0.23
	Environment	0.56	0.67	0.57	0.56
Sport	Accommodation	0.07	0.24	0.30	0.21
	Leisure	0.33	0.34	0.24	0.27
	Environment	1.22	0.43	0.42	0.57
Conference	Accommodation	0.23	0.31	0.38	0.30
	Leisure	0.49	0.35	0.41	0.42
	Environment	0.77	0.38	0.30	0.41

We can observe that in general the parameters within each group over time are quite close. Thus in the last column of the Table 4 we report the parameters that Lisrel estimates in the case of the overall invariance (form, measurement and structural parameters) for all the groups.

The results obtained allows to draw some interesting considerations. First, the *TLS* Overall Satisfaction is positively affected by Accommodation, Leisure service and Local environment, supporting Hypothesis 1. Second, the evaluation scheme adopted by tourists in evaluating *TLS* Overall Satisfaction is the same for all the segment and for every period of time. This is a surprising result: unlike the empirical finding in tourism literature, the tourists hosted in Rimini during 2004-2006 show the same pattern of satisfaction, supporting Hypothesis 2. Moreover, no differences among groups of tourists are detected, that is Hypothesis 3 is ac-

cepted. A possible explanation relies on the characteristic of the tourist destination considered in the analysis. Rimini is a *mature destination* and it is typically visited by repeater tourists: this feature can explain the significative invariance of the tourist pattern of evaluation. Moreover, the comparison of final structural parameters highlights the relative importance of factors affecting the overall satisfaction of tourists toward Rimini. Local environment is the most important aspect contributing to increase tourist satisfaction: its score lies between 0.41 and 0.56. Destination safety, security, quietness and viability have the strongest impact on the quality of the staying in Rimini: the more tourists are satisfied by local environment the more they are globally satisfied of their holyday. Then, destination management should pay more attention in maintaining and developing local features because of these items improve the existing performance levels. Leisure supply is slighter powerful in influencing overall satisfaction than hotel quality: the mean score are respectively 0.31 and 0.27. The quality level of nightlife, entertainment, shopping and accommodation services also helps the destination to gain high levels of repeat tourists and attract new customers. Their impact on the well staying in Rimini is considerably important and contribute to improve the image of the destination.

6. CONCLUSION

Tourist satisfaction is an important tool to guarantee the successful of a destination because it influences the choice of a destination, the consumption of goods and services, the decision to return and the expansion of tourist flow. Then, the analysis can help destination management to both improve the efficiency of communications and obtain a better planning and allocation of resources, increasing destination competitiveness.

The aim of the paper is to investigate if tourists, segmented according to their trip motivation (sea, conference and sport), show the same evaluation pattern toward the destination of Rimini and if it changes over time. The conceptual model adopted in the analysis focuses on both the definition of a destination as a *TLS* and how the tourist perceives the relative values of the multi-attributes of the destination. A Multigroups-Multivaves Lisrel model is applied, allowing to investigate the presence of different *TLS* evaluation schemes among different groups of tourists at the same time and over time simultaneously. In order to test the invariance of the nested models, we follow the "Practical Perspective" criterion based on the CFI.

The analysis shows that the *TLS* Overall Satisfaction is positively affected by Accommodation, Leisure service and Local environment. Local environment is the most important aspect influencing tourist overall satisfaction; leisure supply and hotel quality are less powerful in influencing the well-being in Rimini. The evaluation pattern adopted by tourists is also the same for all the segment and for every period of time: the maturity of the destination and the high number of repeater tourists may influence the overall satisfaction scheme used to evaluate the *TLS* of Rimini.

Future research can regard the extension of the present analysis to the investigation of the relationship among tourist satisfaction, loyalty and the intention to return. By introducing the items relative to the number of previous visits in Rimini and the intention to revisit the destination in the model, we allow to highlight the future tourist segment behaviour toward Rimini.

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SUMMARY

Multigroup-multiwaves Lisrel modeling in tourist satisfaction analysis

The paper analyzes the influence of tourist heterogeneity on the Tourist Local System Overall Satisfaction and its changes over time. We investigate two aspects: if different tourists segmented according to their trip motivation (seaside, conference and sport) show the same pattern of evaluation toward some relevant features of the *TLS* and if the evaluation scheme is dynamic. At this aim, a Multigroup-Multiwaves Lisrel model is estimated on a data set from the Tourist Satisfaction Survey, conducted in Rimini from 2004 to 2006 by the Faculty of Statistics – University of Bologna. The analysis shows that tourist evaluation scheme toward Rimini is quite similar among groups and over time, suggesting that differences among tourists do not affect *TLS* satisfaction.