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Measuring the seasonality in tourism with the comparison of different methods

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Abstract

Purpose – Most of the European Mediterranean countries are suffering from seasonality and the problems caused by it. By applying different methods, this study proposes to measure seasonality in a Mediterranean country, Turkey. Studying seasonality and its measurement with the comparison of different methods could first provide useful guidelines for the countries, which may have similar problems, and could also broaden the current view in the related literature since the focus is also on the comparison of the widely used methods in the literature.

Design/methodology/approach – The study depends on the current literature and makes evaluations based on the secondary data acquired from the statistical publications of The Turkish Ministry of Culture and Tourism.

Findings – The findings reveal that none of the methods is superior to any other. They complement the weaknesses of one another. Therefore, it is suggested that destinations, when measuring their seasonality, should evaluate seasonality by applying different methods in order to give a proper decision to solve the problem caused by seasonality.

Originality/value – The study contributes to the seasonality literature by employing different measurement methods in a holistic way. It reveals differences and similarities among the different methods, using the case of a Mediterranean country, Turkey.

Keywords Seasonality, Measurement, Tourism, Turkey

Paper type Conceptual paper

Introduction

International tourism is of great importance to the economies of Mediterranean countries with its creation of foreign exchange earnings, employment, generation of income and regional development effects (Dieke and Karamustafa, 2000). However, the Mediterranean tourism industry has traditionally been characterized by strong seasonality, with large differences in occupancy rates between winter and summer (Amelung and Viner, 2006; Hoti et al., 2007). Seasonality not only reduces profitability and renders human resources management difficult, it also causes temporal variations in the capacity utilization of facilities and hence their productivity (Ashworth and Thomas, 1999; Krakover, 2000; Ismert and Petrick, 2004). In a peak season or in a region with only one strong season, congestion and overbooking will reduce the quality of service if the number of tourists exceeds the bed capacity. In such conditions, businesses may suffer a decline in their profit that would not be compensated in the low or off-season (Parrilla et al., 2007).

There are a number of studies focusing on the effects of seasonality on employment (Ball, 1988; Lee-Ross, 1999; Hinch and Jackson, 2000; Flögelfeldt, 2001; Nesheim, 2003;...
Getz and Nilsson, 2004). Krakover (2000) has studied the relationship between the factors causing changes in the number of employees working in Israeli hotels and the tourism demand. The variables that have been investigated can be categorized as international and domestic tourist demand, occupancy rates, seasonality indices, and long-term trends. The study of Krakover indicates that there is a negative correlation between the changes in employee numbers and the occupancy rates. Ashworth and Thomas (1999) analyzed the employment strategies developed against seasonality in the UK between 1982 and 1996. One of the most important problems related to the seasonal employment is to hire and keep the full-time skilled human resources. This results in the direction of low-educated, unskilled, and semi-skilled workforce to the industry. This causes unsustainability of the quality of services (Jolliffe and Farnsworth, 2006). In fact, seasonality affects all aspects of the tourist industry, including hotel occupancy rates, as well as employment and retention of labor, and under-utilization of tourist attractions and services during the off-season (Koc and Altinay, 2007). Furthermore, overcrowding is another consequence of seasonality during the high season. Could anything be done to solve the seasonality problem? In this context, Butler (1994, p. 335) suggests the ways in which the seasonality problem could be overcome:

- trying to lengthen the main season, establishing additional seasons, diversifying markets, using differential pricing and tax incentives on a temporal basis, encouraging the staggering of holidays, encouraging domestic tourism in off-seasons, and providing off-season activities such as festivals and conferences.

However, the application and success of some of those recommendations in destination countries are subject to the following factors:

- availability of various tourism attractions;
- governmental support to encourage domestic tourism; and
- skilled planners and policy makers.

From the previous argument, it can be concluded that seasonality in tourism is important to examine since it creates economic and social problems as well as negative effects on service quality in the tourism industry: hence, the importance of measuring seasonality in tourism. By using various statistical methods, seasonality can be measured (Sutcliffe and Sinclair, 1980; Drakatos, 1987; Donatos and Zairis, 1991; Uysal et al., 1994; Grainger and Judge, 1996; BarOn, 1999; Coenders et al., 2001; Koenig and Bischoff, 2004, 2005; Bender et al., 2005; Weidner, 2006) and seasonal demand can be forecasted (Kulendran and King, 1997; Chen and Fomby, 1999; Grubb and Mason, 2001; Lim and McAleer, 2001a, b; Goh and Law, 2002; Ahas et al., 2007). Depending on the number of foreign tourist arrivals, as the demand can be forecasted for the whole destination, it can also be done for the accommodation establishments in the same way. Although, measuring the seasonality and forecasting the seasonal tourist demand have been paid attention wide in the previously mentioned literature, these kinds of studies (Koenig and Bischoff, 2005; Weidner, 2006) were:

- conducted mostly by focusing on the number of foreign tourist arrivals; and
- generally focused on one method only.

In this context, it is the aim of this study to contribute to the measurement of the seasonality literature by employing different methods in a holistic way and reveal the
differences and similarities with the comparison of those methods in the case of the Turkish tourist industry.

Turkey is located in the eastern part of the Mediterranean basin, has a Mediterranean climate, and international tourism has been perceived as a locomotive sector for its economic development since the 1980s; it has been supported with generous investment incentives by the various Turkish governments (Dieke and Karamustafa, 2000; Karamustafa, 2000). This governmental support has helped to increase the bed capacity of the Turkish tourism industry more than tenfold (TURSAB, 2009a). Parallel to the increase of the bed capacity, the number of visitors visiting the Turkish coastal tourist destinations increased with the creation of considerable net foreign exchange earnings. However, the uncontrolled increase of the bed capacity and its uncontrolled concentration on the coastal regions has emerged as a seasonality problem in the Turkish tourism industry. This is to say that despite to the increased numbers of accommodation establishments and tourists, the distribution of tourist numbers to the months of year is chaotic. For instance, the number of tourists visiting Turkey is very large particularly during the summer months; however, it declines during the rest of the year resulting in disequilibrium between the bed supply and the tourist demand (Unluonen et al., 2008). This creates problems particularly for the accommodation establishments, which suffer from the idle capacity problem for most of the year, particularly on the coastal areas, which consist of approximately 75 per cent of the licensed bed capacity (TURSAB, 2009b). For this reason, within the framework of Turkish tourism, studying seasonality is important for the tourism industry within the Mediterranean basin.

Against the background briefly presented previously, this study summarizes the general characteristics of tourism demand, and the factors that affect it, since demand patterns are one of the important legs of tourism seasonality (Koenig and Bischoff, 2005, p. 207), and, then moves on to review the seasonality measurement methods within the frame of Turkish tourism data, and finally, tries to compare the seasonality measurement techniques.

Tourism demand (definition, characteristics and forecasting)

Tourism demand is defined in numerous ways (see Cooper et al., 1993, p. 15). Mathieson and Wall (1982, p. 1) define tourism demand as:

- “the number of persons who travel, or wish to travel, to use tourist facilities and services at places away from their places of work and residence”;

while Pearce (1995, p. 18) describes it as:

- “the relationship between individuals’ motivation [to travel] and their ability to do so”; and

as Cooper et al. (1993, p. 15) point out, economists consider tourism demand to be:

- “the schedule of the amount of any [tourism products] which people are willing and able to buy at each specific price in a set of possible prices during a specified period of time”.

For the purpose of this study, tourism demand can be defined as the number of people who are willing to travel and have the amount of money that meets their travel willingness. Characteristics of tourism demand can be summarized as follows (Olali and Timur, 1988; Lim, 1997):
People travel for several reasons such as holidays, visiting friends and relatives (VFR), business, employment and sports, but holiday travel remains the dominant sector of the international travel market. According to travel literature, holiday travel to a destination is influenced by two major attributes:

1. The attractiveness of that destination.
2. Travelers’ ability to travel to that destination in terms of situational constraints (Woodside and Lysonski, 1989; Um and Crompton, 1990, 1992; Crompton and Ankomah, 1993).

Situational constraints are those associated with factors such as:

- economic (level of disposable income, cost of travel, travel distance, availability and the quality of tourist facilities in destinations);
- socio-demographic (population structure, age, urbanization, professions, educational level, leisure time);
- politics and legislation (restrictions on tourist movements, politic relations between the origin and the destination); and
- psychological (travel motivation, tourist needs and typologies) (Um and Crompton, 1990, 1992; Woodside and Lysonski, 1989), the latter is empirically observed to be more important than the former (Um and Crompton, 1992).

It is important to note that there is fierce competition even among the tourism products themselves depending on the individual preferences of tourists and the factors that motivate them to travel. Therefore, marketers of destinations are required to be aware of these factors in order to fulfill the correct demand forecast (Bozok, 1996). Forecasting enables decision-makers to plan future strategies. In this respect, demand forecast indicates the level of demand concentrated on specific time-periods. It is required:

- to be precise;
- not to be acquired at high costs; and
- to be able to be updated simply.

A demand forecast can guide a firm when applying marketing strategies; with the evaluation of demand forecast, marketers can detect which market(s) to enter. In this respect, demand forecast carries out two main functions (Lumsdon, 1997):

1. To contribute to the allocation of the resources effectively to the marketing efforts.
2. To reduce the risk of the strategies for the future.

Tourism demand changes depending on economic, social, and political variables. For instance, demand for the accommodation establishments varies daily, weekly and
monthly from time to time resulting in the issue of seasonality. In this study, the focus of seasonality will be on the monthly basis. Accommodation establishments can forecast the room and the bed occupancy rates depending on the estimated number of seasonal tourist arrivals (Koenig and Bischoff, 2004). Widely used demand forecasting methods can be grouped as follows (Cuhadar and Kayacan, 2005):

1. Qualitative.
2. Quantitative.

Qualitative methods include:
- traditional questionnaire technique;
- Delphi technique; and
- multi-decisional supported model.

Quantitative methods consist of:
- the time series and trend analysis;
- computer systems and simulation techniques;
- demand creative techniques; and
- multivariable regression analysis.

Being one of the widely used quantitative demand forecasting methods, the time series and trend analysis takes into account seasonal variations; hence, it is one of the most suitable techniques to forecast the seasonal demand. Time series occur with the statistical data observed and recorded periodically, such as tourism revenues, number of tourists, number of nights stayed, tourist expenses and tourism employment. Demand forecast requires decision-makers at a destination to get information regarding the tourist movements of the previous years; hence, the number of tourist arrivals in future can be estimated. This method is used with the assumption that the future events will occur as heretofore. The basics of time series depend on finding out the reasons for any irregular movements and fluctuations in the series (Içöz and Kozak, 1998; Halpern, 2007).

In general, time series consist of four elements:

1. Trend (T).
2. Seasonal variation (S).
3. Cyclical variation (C).
4. Irregular variation (I).

A trend can be either a linear or a curve which can either rise or fall in a given time period. All values in a time series cannot be expected to be on the trend line or the curve. Some values can be on the trend line or under it. Cyclical variations consist of the values, which are clearly on or under the trend line in years. Trend and cyclical variations can be determined by analyzing the variations in the number of years; seasonal variations can be determined by analyzing the stable variations observed regularly in a period of a year or season. Irregular variations in time series consist of the fluctuations apart from the trend, cyclical variations, and seasonal variations (Anderson et al., 1993). According to the traditional time series model, the number of tourists arrived can be formulized as $T \times S \times C \times I$ (Mansfield, 1994).

However, forecasting the seasonal demand mainly depends on its measurement. This is to say that by measuring seasonality, its dimensions can be determined and
then seasonal demand can be forecasted. In this respect, since seasonality is an important issue for the accommodation establishments, its measurement is also gaining importance (Allcock, 1989). Efforts to extend the peak tourist season can be successful depending on the determinations of seasonal demand structures, which can be used to make regional comparisons (Donatos and Zairis, 1991; Hingham and Hinch, 2002). Seasonal demand structure can be determined by calculating the seasonality ratio derived from the number of tourist arrivals and occupancy rates, and by also, drawing the graphics of the seasonal fluctuations (Goulding and Gunn, 2000). Hence, the months of the year can be determined as being the peak season, the shoulder season, and the off-peak season (Yacoumis, 1980).

Measuring seasonality in tourism
Butler (2001, p. 5) defines seasonality as “a temporal imbalance in the phenomenon in tourism”. On the other hand, Allcock (1989) argues that the term “seasonality” means the concentration of the tourism flows in a certain period of time in a destination country. Seasonality has two main sources (Hartman, 1986; Butler, 1994): one is natural seasonality; and the other is institutionalized seasonality. The first type of seasonality refers to the climatic conditions in the destination countries that affect the holiday season (de Freitas et al., 2008). For example, ski resorts suffer the seasonality problem in the summer, while seaside resorts suffer it in the winter (Jefferson and Lickorish, 1988; Andriotis, 2005). The second type of seasonality is induced by human decision and relates to the holiday periods of the tourists in tourist generating countries, which have effects on the tourism season. One of the most common types of institutionalized seasonality is public holidays: summer, Christmas, and Easter holidays (Dieke, 1988) and tourists usually go on holiday during these periods. City centre hotels face the problem of seasonality every weekend and certainly on Bank Holiday weekends, when they are not accommodating business travelers.

Seasonality can be expressed in the number of visitors, the expenditures of the visitors, the traffic on the highways and other forms of transportation, the employment or in the number of admissions to attractions (Butler, 2001, p. 5). As Butler and Mao (1997) classify, there are three different types of seasonality:

1. One-peak.
2. Two-peak.

Mediterranean countries whose tourism demand is primarily driven by the sun and warm weather follow a one-peak pattern characterized by a pronounced peak season in the summer months. Two-peak seasonality occurs when there are two seasons. Non-peak seasonality means tourism is not seasonal indicating that tourism activities occur throughout the year. In order to calculate the peak season, a simple method can be proposed. If some months of the year are systematically above the trend and the seasonal index is greater than one, the mentioned term can be called as the peak season (Fernández-Morales, 2003). A seasonal index indicates the degree of seasonal variations. A seasonal index shows increases and decreases of demand comparing them to the average during the season (Celikcapa, 1999; Nadal et al., 2004; Amelung and Viner, 2006; Lim and McAleer, 2008). Various measurement methods, including “Coefficients of variability” (the coefficient of seasonal variation in terms of standard deviation), “Concentration indices”, “Amplitude ratios” and “Similarity indices” are
applied to compare the acuteness of seasonality for different regions. Among others, “Seasonal range” (difference between highest and lowest monthly indices), “The seasonality ratio” (the largest value divided by the average), “The seasonality indicator” (the average divided by the largest value), “The Gini coefficient”, “The maximal annual utilization factor constrained by seasonality”, and “The seasonal underutilization factor” have been developed, and applied to investment theory (e.g. financial portfolio theory) which has been used to measure and analyze seasonal patterns (BarOn, 1999; Lundtorp, 2001; Jang, 2004; Nadal et al., 2004; Koenig and Bischoff, 2005). However, the main and widely used indicators to measure seasonality are (Nadal et al., 2004; Koenig and Bischoff, 2005; Weidner, 2006; Chung, 2009):

1. The seasonality ratio.
2. The seasonality indicator.
3. The Gini coefficient.
4. The seasonality index.

Usually, seasonality is measured in number of visitors. Other units could be the number of arrivals or departures, the number of overnight stays, the length of stay or the expenditures of the visitors. This then needs to be measured on a daily, weekly, monthly, or quarterly basis. These techniques are explained in the following depending on the Turkish international tourist arrivals. Although an analysis that depends on the number of stays in accommodation establishments has been the focus in this study and would be more vigorous for the accommodation establishments, the lack of data has limited us with only the analysis on the number of international tourist arrivals on a monthly and yearly basis.

The seasonality ratio
Yacoumis (1980) calculated the seasonality ratio in the case of the tourism industry of Sri Lanka. He established a graph that employed these ratios; hence, he determined the seasonal demand structure, which helped clarify whether seasonality shows schematic similarities among the years or not. Seasonality ratios, and graphics can be used to compare either seasonal demand, and regional demand, or among the tourist markets themselves.

Determining the peak-, shoulder- and off-peak seasonal months for a given country is important to indicate which strategies to choose to apply for the seasonal variations of a year. Determination of the peak-, shoulder- and off-peak seasons by months at a regional level is important to the accommodation establishments in order to decide which strategies to apply. This can also be beneficial for benchmarking both for the similar regions and the similar type of accommodation establishments (see Table I).

The Seasonality Ratio is calculated by taking the highest number of visitors and dividing these by the average number of visitors (Yacoumis, 1980). This ratio increases with the degree of seasonal variation. Depending on Yacoumis’ calculations, Turkey’s tourism seasonality ratios are calculated in Table II for the years between 1995 and 2007. First, monthly seasonal indices have been found by dividing the number of monthly tourist arrivals in a given year to the monthly average number of tourist arrivals in the given year. Second, the highest seasonal index in the given year has been divided by the average seasonal index; hence, the seasonality ratio has been calculated. For example, the seasonality ratio for the year 2007 has been calculated as follows:
<table>
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<th>2</th>
<th>3</th>
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<th>5</th>
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<td>718</td>
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</table>

**Source:** The Turkish Ministry of Culture
Determination of the seasonal index by months: the number of tourist arrivals in January 2007 has been divided by the average number of tourist arrivals in that year, 714,425/1,945,076 = 37 per cent. For the rest of the months of the year seasonality indices can be calculated in the same way.

The highest seasonal index for the year 2007 (July) has been divided by the average seasonal index (the average index value is 100) (186/100); hence, the seasonality ratio for the year 2007 is 1.86.

It is possible to show seasonality ratios of two different years on a graph. Seasonality ratios of 1998 and 2007 are given in Figure 1. Those two years, in which seasonality ratios are different, indicate a similar seasonal demand structure on the graph.

As can be noticed from Figure 1, seasonality indices for some months they are higher than the average (the peak season months), for some months they are close to the average (the shoulder season months) and for some months are below the average (the off-peak season months). According to the graph, July-August-September are the peak-season months, May-June-October are the shoulder season months, November-December-January-February-March-April are the off-peak season months for Turkey.

Theoretically, the seasonality ratio can vary from 1 to 12. If the number of visitors arriving is constant for every month, then the seasonality ratio will be 1. If the number of visitors arriving is concentrated on a month, then the seasonality ratio will be 12. This is to say that when the seasonality increases, the seasonality ratio will increase.

The seasonality indicator

Since occupancy rates are accepted as the indicator of accommodation establishments’ performance, the seasonality ratio cannot be satisfactory in making comparisons (Jeffrey and Barden, 2000). For this reason, the seasonality indicator (ω or omega), which is the inverse version of the seasonality ratio, can be used. The seasonality indicator, which can be interpreted easily, is calculated by dividing the average seasonality index to the highest seasonal index. As during the peak season, when the accommodation establishments are fully occupied, the highest accommodation number refers to the capacity of the accommodation establishments (Koenig and Bischoff, 2004). The seasonality indicator implies the average occupancy rate since it refers to the average

<table>
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<tr>
<th>Months/years</th>
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Table II. Seasonality ratios (1995-2007)
stays in the accommodation establishments within the whole capacity. In this respect, the seasonality indicator can be seen as a capacity use measure. For instance, if the seasonality indicator is 0.5, this means that only 50 per cent of the accommodation capacity is used. If the highest accommodation number is smaller than the capacity, the seasonality indicator refers to the highest capacity use for the given year (Lundtorp, 2001). Theoretically, the seasonality indicator can vary from 1/12 to 1. If the number of visitors arriving is constant for every month, then the seasonality indicator will be 1. If the number of visitors arriving concentrate on one month then the seasonality ratio will be 1/12. This is to say that with a decrease in the variation, the ratio increases. In fact, the seasonality indicator is also exactly the same measure as the Maximal Annual Utilization Factor Constrained by Seasonality developed by BarOn (1975) with the only difference that BarOn uses seasonal indices, where the annual average is normalized to a figure of 100; for instance the Maximal Annual Utilization Factor Constrained by Seasonality is simply the ratio of 100 and the relative demand in the peak month. Both the seasonality index and the Maximal Annual Utilization Factor Constrained by Seasonality can also be interpreted as the relative capacity use in comparison to the peak month (Koenig and Bischoff, 2002, pp. 8-9).

As mentioned previously, the calculation of the seasonality indicator is inverse to the calculation of the seasonality ratio; therefore, the average index value (100) is divided by the highest seasonal index. In Table III, by taking into account the calculated seasonal index values, seasonality indicators have been calculated for the year 2007: the average index value (100) has been divided by the highest seasonal index value for the year 2007 (seasonal index for July = 186) (100/186); hence, the seasonality indicator for the year 2007 is 0.54. In Table III, seasonality indicators, calculated depending on the values in Table II, are given. It is important to note that since the data regarding the actual accommodation stays are not available, the number of tourist arrivals has been accepted as the number of stays in the accommodation establishments. In fact, as mentioned previously, a seasonality indicator is required to be calculated on the basis of the number of stays in the accommodation establishments.

A seasonality ratio and seasonality indicator can be criticized as being affected by the highest monthly value. This means that while the number of arrivals or the occupancy rates are close to the average in most of the months, in some months of the year they can
be very high which results in high seasonality rates and seasonality indicators. Because of this, the Gini coefficient can be suggested to measure the seasonality.

The Gini coefficient
This is the most commonly used measure of inequality. The coefficient varies between zero, reflecting complete equality, and 1, indicating complete inequality. Graphically, the Gini coefficient can easily be represented by the area between the Lorenz curve and the line of equality (Lundtorp, 2001; Weidner, 2006). The Lorenz curve has been provided in Figure 2 from the figures in Table IV, which provides the numbers of tourist arrivals by months. The numbers of monthly tourist arrivals, have been divided, by the total number of tourist arrivals, within the given year; hence, the monthly tourist arrival ratios have been calculated. These ratios have been ranked from low value to high value, and the cumulative values of these ratios have been calculated. The Lorenz curve in Figure 2 has been drawn depending on these ratios.

The Lorenz curve in Figure 2 shows the distribution of tourist numbers against the months of years. If the distribution of tourist numbers were equal, the plot would show as a straight, 45° line. For instance, during the first three-quarters of a year (corresponding to the first nine months), 75 per cent of the total tourist arrivals would occur. However, unequal distributions have yielded a curve. The gap between this curve and the 45° line is the inequality gap, because the number of tourists arriving each month is not equal. In some months of the year, the number of tourist arrivals is low (for instance, in the case of Turkey, the winter months), while in some months it is high (for instance, in the case of Turkey, the summer months); hence, there is an unequal distribution of tourist arrivals among the months of the year. As can be seen from the Figure 2, the number of tourist arrivals in the first three-quarters of 1998 (the first nine months of 1998) consisted of 61 per cent of the total tourist arrivals. However, the number of tourist arrivals in the first three quarter of 2007 (the first nine months of 2007) consisted of 58 per cent of the total tourist arrivals. Depending on these results, it can be said that the inequality of tourist arrivals among the months is higher in 2007 compared with 1998.

The unequal distribution of the number of tourist arrivals can be understood from the distance of the curve from the 45° straight line in Figure 2. How much distribution of the actual number of tourist arrivals yields a curve, it means that the distribution of

<table>
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Table III. Seasonality indicators (1995-2007)
the number of tourist arrivals shows that much inequality (Dinler, 2003). As can be seen from Figure 2, the curve of 2007 has yielded more than the curve of 1998.

Another way to evaluate the unequal distribution of tourist arrivals depends on the Gini coefficient, which also benefits from the Lorenz curve. In this respect, the Gini coefficient (G) is the proportion of the area left between the 45° straight line and the curve to the total area above (the area left between the 45° straight line and the curve)

**Table IV.**

Tourist arrivals by months (1998 and 2007)

<table>
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<th>Years/months</th>
<th>1998</th>
<th>2007</th>
</tr>
</thead>
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<td>January</td>
<td>346,183</td>
<td>714,425</td>
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<td>February</td>
<td>371,526</td>
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<td>March</td>
<td>476,756</td>
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<td>April</td>
<td>642,332</td>
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<td>May</td>
<td>986,237</td>
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</tr>
<tr>
<td>June</td>
<td>1,062,961</td>
<td>2,774,076</td>
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<tr>
<td>July</td>
<td>1,288,439</td>
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<td>August</td>
<td>1,460,075</td>
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<td>December</td>
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</tr>
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<td>Total</td>
<td>9,754,695</td>
<td>23,342,914</td>
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</table>

**Source:** The Turkish Ministry of Culture and Tourism (Kulhur ve Turizm Bakanlığı, 2008)
and below the curve. As shown in Figure 3, the Gini coefficient is the proportion of area A to the total of areas A and B; it can be formulized as \( G = \frac{A}{A + B} \) (Unsal, 2003).

The Gini coefficient implies the inequality as a ratio. The greater the ratio, the greater the unequal monthly distribution of tourist arrivals. A zero ratio indicates a perfect equality. The value of 1 for the Gini coefficient means that there is a full unequal distribution of number of tourist arrivals by months. As the coefficient gets closer to 1, the inequality increases (Unay, 1997). The formula used in the calculation of the Gini coefficient is explained in the following (Lundtorp, 2001):

\[
G = \frac{\frac{1}{n} \sum_{i=1}^{n} (x_i - y_i)}{n}
\]

\( n \) = ratio value (in the case of this study, number of months = 12).

\( x_i \) = ratio order (i.e. 1/12, 2/12, \ldots, 12/12).

\( y_i \) = cumulative actual ratios in the Lorenz curve.

By using this formula, the Gini coefficients for 1998 and 2007 have been calculated as 0.25 and 0.29, respectively. It indicates that the inequality of the monthly distribution of number of tourist arrivals is higher in 2007 compared to that of 1998. In other words, what is clear here is that as the Gini coefficient increases, the level of seasonal concentration increases (Ferna´ndez-Morales, 2003).

As the Gini coefficient can be calculated for each year, it can also be calculated for the different nationalities staying in the accommodation establishments. In this respect, the Gini coefficient may help the accommodation establishments to apply appropriate marketing strategies on seasonality for various markets (Fernández-Morales and Mayorga-Toledano, 2008). The nationalities given in Table V indicate the first 12 nationalities stayed in the Turkish accommodation establishments between the years of 2000 and 2006. The nationalities are ranked in descending order by the number of visitors who stayed in the accommodation establishments.

According to the figures in Table V, Germans are ranked first in terms of tourists staying in the accommodation establishments, and the Gini coefficient for German tourists staying in the accommodation establishments showed a

![Figure 3. Calculation of the Gini coefficient on the Lorenz curve](image)
diminishing trend between 2000 and 2006. In this respect, it can be said that German tourists staying in the accommodation establishments have not concentrated on some months of the years; compared to other nationalities, their stays have showed a trend of an equal distribution among the months of the years. However, the citizens of the Commonwealth of Independent States are ranked second in terms of tourists staying in the accommodation establishments, and the Gini coefficient for those staying in the accommodation establishments showed an increasing trend between 2000 and 2006. In this respect, it can be said that tourists from the Commonwealth of Independent States staying in the accommodation establishments have concentrated on some months. This kind of analyses may produce useful guidelines for the accommodation establishments in determining the right marketing strategies when deciding to choose which tourist market to enter, to eliminate the negative impacts of seasonality.

As mentioned before, a seasonality ratio and a seasonality indicator are mostly affected by the time-period of the highest tourist arrivals. On the other hand, although the Gini coefficient is affected by the time-period of the highest tourist arrivals, this effect is not significant. It is worth noting that neither the Gini coefficient nor the seasonality indicator values show the skewness of seasonal fluctuations. For this reason, it is appropriate to examine the seasonal fluctuations in a figure (Lundtorp, 2001). The ratios of monthly tourist arrivals in 1998 and 2007 in Figure 4 derived from the figures in Table I with the assumption of the number of stays in the accommodation establishments. The highest monthly tourist arrival ratio has been assumed as the capacity that the accommodation can supply. This is because, as mentioned previously, the highest monthly tourist arrival ratio can be accepted as the maximum use of the accommodation capacity.

Seasonal fluctuations among the months in 1998 and 2007 have similarities. As can be seen from Figure 4, the months of January-February-March-April, both in 1998 and 2007, are the first off-peak seasonal months. May and June show an increase in the accommodation ratio. These months can be called the first shoulder-seasonal months. July-August-September are the months in which the accommodation establishments reach full capacity use or very close to it. Hence,
these months can be called the peak-season months. However, in October, the accommodation ratio decreases; therefore, it can be called as the second shoulder-seasonal month. In November and December, the accommodation ratio reaches its lowest value, and these months can be called as the second off-peak seasonal months. In Figure 4, the seasonal fluctuation of 1998 shows skewness compared to the seasonal fluctuation of 2007. The seasonality indicator is 0.56 in 1998 and 0.54 in 2007. The Gini coefficient was calculated 0.25 for 1998 and 0.29 for 2007. Reduction of the inequality among the months can be possible as the Gini coefficient closes to zero or the seasonality indicator closes to 1. Depending on the Gini coefficients, the seasonality indicators and Figure 4, it can be said that the unequal distribution of the number of tourist arrivals in 1998 is less compared to that of 2007. In this respect, it can be asserted that seasonality fluctuations during this ten-year period have increased to some extent.

The Gini coefficient is a useful tool indicating the inequality in the distribution of the number of tourist arrivals. However, the distribution of number of tourist arrivals occurs together with trend (T), seasonal (S), cyclical (C) and irregular (I) fluctuations. In this respect, the Gini coefficient can be criticized as being insufficient in determining the monthly distribution of tourist arrivals since it takes into account only seasonal fluctuations. Therefore, distribution of monthly tourist arrivals should be decomposed from the affecting factors such as trend (T), seasonal (S), cyclical (C) and irregular (I) fluctuations. This kind of decomposition can be done by the seasonality index, which is calculated through the method of moving averages.

The seasonality index (time series model)
The monthly seasonality index can be calculated through the application of the moving averages method. When this method is applied, it is possible to decompose the distribution of monthly tourist arrivals from trend (T), seasonal (S), cyclical (C) and irregular (I) fluctuations (DeLurgio, 1998). It can be useful to explain this method with an example as in Table VI depending on the number of monthly tourist arrivals between 2003 and 2007.
<table>
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<th>Year</th>
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<th>Number of tourist arrivals</th>
<th>12 months moving average</th>
<th>Central moving average</th>
<th>Ratio of number of tourist arrivals to the central moving average</th>
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</thead>
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<td>February</td>
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<tr>
<td></td>
<td>March</td>
<td>499,663</td>
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<tr>
<td></td>
<td>May</td>
<td>1,146,309</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>1,510,951</td>
<td>1,169,130</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>July</td>
<td>2,130,949</td>
<td>1,183,272</td>
<td>1,176,201</td>
<td>1.812</td>
</tr>
<tr>
<td></td>
<td>August</td>
<td>2,275,055</td>
<td>1,193,823</td>
<td>1,188,548</td>
<td>1.914</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>1,874,329</td>
<td>1,217,526</td>
<td>1,205,674</td>
<td>1.555</td>
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<tr>
<td></td>
<td>October</td>
<td>1,657,726</td>
<td>1,253,775</td>
<td>1,235,651</td>
<td>1.342</td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>776,181</td>
<td>1,308,177</td>
<td>1,280,976</td>
<td>0.606</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>643,872</td>
<td>1,340,467</td>
<td>1,324,322</td>
<td>0.486</td>
</tr>
<tr>
<td>2004</td>
<td>January</td>
<td>533,694</td>
<td>1,378,816</td>
<td>1,359,641</td>
<td>0.393</td>
</tr>
<tr>
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<td>February</td>
<td>607,854</td>
<td>1,306,961</td>
<td>1,287,889</td>
<td>0.438</td>
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<td>March</td>
<td>784,107</td>
<td>1,417,852</td>
<td>1,407,407</td>
<td>0.557</td>
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<td></td>
<td>April</td>
<td>1,104,270</td>
<td>1,433,232</td>
<td>1,425,542</td>
<td>0.775</td>
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<td></td>
<td>May</td>
<td>1,799,130</td>
<td>1,447,618</td>
<td>1,440,425</td>
<td>1.249</td>
</tr>
<tr>
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<td>June</td>
<td>1,898,435</td>
<td>1,459,742</td>
<td>1,453,680</td>
<td>1.306</td>
</tr>
<tr>
<td></td>
<td>July</td>
<td>2,591,140</td>
<td>1,473,640</td>
<td>1,466,691</td>
<td>1.767</td>
</tr>
<tr>
<td></td>
<td>August</td>
<td>2,492,794</td>
<td>1,481,039</td>
<td>1,477,340</td>
<td>1.687</td>
</tr>
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<td></td>
<td>September</td>
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<td>1,507,976</td>
<td>1,494,508</td>
<td>1.222</td>
</tr>
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<td>October</td>
<td>1,842,277</td>
<td>1,528,309</td>
<td>1,518,143</td>
<td>1.214</td>
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<td>948,815</td>
<td>1,570,247</td>
<td>1,549,278</td>
<td>0.612</td>
</tr>
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<td>789,367</td>
<td>1,612,287</td>
<td>1,591,267</td>
<td>0.496</td>
</tr>
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<td>January</td>
<td>700,469</td>
<td>1,661,425</td>
<td>1,636,856</td>
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<td>698,643</td>
<td>1,692,121</td>
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<td>1,107,348</td>
<td>1,723,546</td>
<td>1,707,833</td>
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</tr>
<tr>
<td></td>
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<td>1,348,264</td>
<td>1,745,723</td>
<td>1,734,634</td>
<td>0.777</td>
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<tr>
<td></td>
<td>May</td>
<td>2,302,389</td>
<td>1,754,368</td>
<td>1,750,045</td>
<td>1.316</td>
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<tr>
<td></td>
<td>June</td>
<td>2,402,912</td>
<td>1,760,407</td>
<td>1,757,388</td>
<td>1.327</td>
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<tr>
<td></td>
<td>July</td>
<td>3,180,802</td>
<td>1,757,646</td>
<td>1,759,027</td>
<td>1.008</td>
</tr>
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<td></td>
<td>August</td>
<td>2,861,141</td>
<td>1,751,806</td>
<td>1,754,726</td>
<td>1.051</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>2,502,123</td>
<td>1,736,352</td>
<td>1,744,079</td>
<td>1.435</td>
</tr>
<tr>
<td></td>
<td>October</td>
<td>2,188,398</td>
<td>1,739,407</td>
<td>1,737,379</td>
<td>1.214</td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>1,052,561</td>
<td>1,706,442</td>
<td>1,722,424</td>
<td>0.611</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>861,836</td>
<td>1,703,585</td>
<td>1,705,013</td>
<td>0.505</td>
</tr>
<tr>
<td>2006</td>
<td>January</td>
<td>667,337</td>
<td>1,697,662</td>
<td>1,700,623</td>
<td>0.392</td>
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<tr>
<td></td>
<td>February</td>
<td>626,565</td>
<td>1,701,385</td>
<td>1,699,523</td>
<td>0.369</td>
</tr>
<tr>
<td></td>
<td>March</td>
<td>921,892</td>
<td>1,681,803</td>
<td>1,691,594</td>
<td>0.545</td>
</tr>
<tr>
<td></td>
<td>April</td>
<td>1,372,922</td>
<td>1,648,930</td>
<td>1,653,366</td>
<td>0.824</td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>1,918,809</td>
<td>1,646,225</td>
<td>1,647,577</td>
<td>1.165</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>2,368,628</td>
<td>1,651,653</td>
<td>1,648,939</td>
<td>1.436</td>
</tr>
<tr>
<td></td>
<td>July</td>
<td>3,109,727</td>
<td>1,655,577</td>
<td>1,653,615</td>
<td>1.081</td>
</tr>
<tr>
<td></td>
<td>August</td>
<td>2,905,817</td>
<td>1,668,950</td>
<td>1,662,264</td>
<td>1.748</td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>2,267,146</td>
<td>1,683,788</td>
<td>1,676,370</td>
<td>1.352</td>
</tr>
<tr>
<td></td>
<td>October</td>
<td>1,713,916</td>
<td>1,696,125</td>
<td>1,689,957</td>
<td>1.014</td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>1,020,106</td>
<td>1,726,862</td>
<td>1,711,494</td>
<td>0.596</td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>926,968</td>
<td>1,760,649</td>
<td>1,743,755</td>
<td>0.532</td>
</tr>
</tbody>
</table>

Table VI.
Method of moving averages (2003-2007)
Calculation of the seasonality index:

(1) The moving average tourist arrival for the first 12 months is calculated 
\[
\]
The same calculation continues for the next 12 months until the last 12 months.

(2) The central moving averages are calculated; i.e. 
\[
[(1.169.130 + 1.183.272)/2 = 1.176.201].
\]

(3) In order to calculate the seasonality index, the number of tourist arrivals is divided by the central moving averages.

According to the traditional time series model, the real value of the tourist arrivals is equal to the values of the formula of \((T \times S \times C \times I)\). Moving average approximates to the value of \((T \times C)\). The ratio of number of tourist arrivals to the central moving average is an estimation of the value of \((S \times I)\) (see column 6 in Table VI). Since the ratios in column 6 in Table VI consist of seasonal and the irregular fluctuations, it should be decomposed from the irregular fluctuations. In order to do that, the median value of ratios for each month is calculated. In Table VII, calculated monthly seasonal indices are arranged in order, and median values are calculated. Monthly median values need to be rearranged by multiplying with the 12-month average \((1,200 = 12 \times 100)\). These rearranged values are accepted as monthly seasonal indices. This calculation can be summarized as follows (Mansfield, 1994):

- median values are calculated;
- calculated median values of each month are multiplied with the number of 1,200 \((12 \times 100)\) and the result is divided by the total of median values; and
- the result is the monthly seasonal index.

<table>
<thead>
<tr>
<th>Year</th>
<th>Months</th>
<th>Number of tourist arrivals</th>
<th>12 months moving average</th>
<th>Central moving average</th>
<th>Ratio of number of tourist arrivals to the central moving average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>January</td>
<td>714,425</td>
<td>1,803,518</td>
<td>1,782,084</td>
<td>0.401</td>
</tr>
<tr>
<td></td>
<td>February</td>
<td>787,048</td>
<td>1,843,372</td>
<td>1,823,445</td>
<td>0.432</td>
</tr>
<tr>
<td></td>
<td>March</td>
<td>1,099,960</td>
<td>1,887,716</td>
<td>1,865,544</td>
<td>0.590</td>
</tr>
<tr>
<td></td>
<td>April</td>
<td>1,520,954</td>
<td>1,924,299</td>
<td>1,906,008</td>
<td>0.798</td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>2,287,645</td>
<td>1,937,413</td>
<td>1,930,856</td>
<td>1.185</td>
</tr>
<tr>
<td></td>
<td>June</td>
<td>2,774,076</td>
<td>1,945,076</td>
<td>1,941,244</td>
<td>1.429</td>
</tr>
<tr>
<td></td>
<td>July</td>
<td>3,624,156</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>August</td>
<td>3,384,065</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>September</td>
<td>2,799,276</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>October</td>
<td>2,152,908</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>1,177,475</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>December</td>
<td>1,018,923</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: The Turkish Ministry of Culture and Tourism (Kulhur ve Turizm Bakangli, 2008)
According to the calculated seasonal indices, while July has the highest seasonal index (180) for the time-period of 2003 and 2007, January has the lowest value (39). From the figures in Table VII, it is possible to examine the seasonal fluctuations among the months in Figure 5.

As can be noticed from Figure 5, the months of January-February-March-April are the first off-peak seasonal months; May and June are the first shoulder-seasonal months; October is the second-shoulder season; and November and December are the second off-peak seasonal months. Based on this description, it can be judged that the Turkish tourism consists of a time period of six months low season, a time period of three months mid-season and a time period of three months peak season between 2003 and 2007. The methods discussed previously are summarized with their strengths and weaknesses comparatively in Table VIII.

### Table VII.
Calculation of the seasonal index (2003-2007)

<table>
<thead>
<tr>
<th>Months</th>
<th>Ratios (× 100)</th>
<th>Median</th>
<th>Seasonal index</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>39.24 39.25 40.09 42.79</td>
<td>39.67</td>
<td>39.42</td>
</tr>
<tr>
<td>February</td>
<td>36.87 41.55 43.16 43.80</td>
<td>42.35</td>
<td>42.09</td>
</tr>
<tr>
<td>March</td>
<td>54.50 55.71 58.96 64.84</td>
<td>57.34</td>
<td>56.98</td>
</tr>
<tr>
<td>April</td>
<td>77.46 77.73 79.80 82.44</td>
<td>78.76</td>
<td>78.27</td>
</tr>
<tr>
<td>May</td>
<td>116.46 118.48 124.90 131.56</td>
<td>121.69</td>
<td>120.93</td>
</tr>
<tr>
<td>June</td>
<td>130.60 136.73 142.90 143.65</td>
<td>139.82</td>
<td>138.95</td>
</tr>
<tr>
<td>July</td>
<td>176.67 180.83 181.17 188.06</td>
<td>181.00</td>
<td>179.87</td>
</tr>
<tr>
<td>August</td>
<td>163.05 168.74 174.81 191.41</td>
<td>171.77</td>
<td>170.70</td>
</tr>
<tr>
<td>September</td>
<td>135.24 142.19 143.46 155.46</td>
<td>142.83</td>
<td>141.94</td>
</tr>
<tr>
<td>October</td>
<td>101.42 121.35 121.36 134.16</td>
<td>121.35</td>
<td>120.60</td>
</tr>
<tr>
<td>November</td>
<td>59.60 60.59 61.11 61.24</td>
<td>60.85</td>
<td>60.47</td>
</tr>
<tr>
<td>December</td>
<td>48.62 49.61 50.55 53.16</td>
<td>50.08</td>
<td>49.77</td>
</tr>
<tr>
<td>Total</td>
<td>1,207.51 1,200.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5.
Seasonal indices of the Turkish tourist arrivals between 2003-2007 by the method of a ratio to moving averages.
Conclusion
This study has examined the seasonality problem in Turkish tourism by applying the widely known seasonality measurement techniques in the tourism literature:

(1) The seasonality ratio.
(2) The seasonality indicator.
(3) The Gini coefficient.
(4) The seasonality index.

As the results of four different widely used methods indicate, Turkish tourism is highly seasonal with the concentration of tourist arrivals in the summer months. The seasonal concentration of the nationalities of tourist arrivals can also be measured by the Gini coefficient. For instance, in the case of Turkey, to some extent, arrivals of German tourists are not as seasonal as much as the tourists arriving from the Commonwealth of Independent States. It is generally recognized that seasonality tends to have more negative effects, particularly from a socio-economic viewpoint. Therefore, necessary attempts should be taken into account to eliminate the negative effects of
seasonality. In this respect, to overcome seasonality and reduce its negative effects, the following can be done:

- lengthen the main season;
- establish various attractions and events;
- diversify target tourist markets;
- apply price differentiation and tax incentives on a temporal basis;
- encourage staggered holidays can be encouraged; and
- encourage domestic tourism in off-seasons.

Our comparative assessment and categorization of the seasonality measurement methods reveal that although none of the seasonality measurement methods are superior to one another, the seasonality indices calculated through the use of moving averages may produce more objective analysis that helps marketers understand the structure of seasonality in the tourism industry. Every method has its strengths and weaknesses as presented in Table VIII. Therefore, it is suggested that a combination of different methods is the best way for analyzing seasonal demand variations and hence broadening the understanding on the structure and the type of seasonality in a given destination country.

More studies can be conducted in various regions and destinations in a comparative way. The seasonality measurement methods used in this study can use the actual number of stays in the accommodation establishments rather than using the number of tourist arrivals. Studies of these kinds may provide clearer understanding of the structure of seasonality in a given destination’s tourism industry.

References
Spatial Development and Impacts of ICT on Physical Space, Vienna University of Technology, Vienna, pp. 303-9, 22-25 February.


**Further reading**


**About the authors**

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