TOWARDS A COMPREHENSIVE CLASSIFICATION OF SEASONALITY TYPES IN TOURISM: THEORETICAL APPROACHES

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Abstract: *We propose, through this paper, a way to label destinations by their seasonality using the seasonal pattern from the seasonal trend decomposition. For each destination, we propose five variables derived from the seasonal curve: when the peak happens (timing), how big the swing is (amplitude), how many peaks there are (one or two), how wide the busy period is (shoulders), and overall seasonal strength. We assigned the following types: Summer peak (peak in Jun–Aug), Winter peak (Dec–Feb), Dual seasonality (two clear peaks), Strong shoulders (broad plateau around a single peak), or Flat/low (weak seasonality). Thresholds come from the data's own percentiles, so the method is reproducible, scalable to thousands of series, and easy to interpret for marketing, staffing, and capacity planning.*

Key words*: Tourism seasonality; STL decomposition; MSTL; rule-based classification; seasonal strength*

INTRODUCTION

Seasonality remains a central characteristic of tourism demand, influencing how destinations allocate resources, coordinate labor, balance infrastructure use, and design marketing strategies [12-14]. Peaks and troughs in visitation affect pricing, mobility management, environmental pressures, and resident perceptions [4, 6, 10]. Despite this relevance, seasonality in both academic and industry contexts is often described in coarse terms—destinations are labeled informally as "summer," "winter," or "year-round," typically based on convention or visual interpretation of demand curves rather than standardized criteria [2, 5, 11, 15].

Recent studies operationalize seasonality using time-series decomposition or related statistical techniques. Contemporary decomposition approaches include STL variants [7, 8], Prophet-style additive models [1, 3], TBATS and related methods for complex seasonal patterns, and automated frameworks implemented in modern forecasting toolkits [9]. These approaches extract a seasonal component that isolates regular intra-year fluctuations, enabling the computation of indices, amplitudes, or concentration metrics. While seasonality is frequently measured, far fewer attempts have been made to classify destinations based on the structural characteristics of their seasonal components.

To address this gap, we introduce a taxonomy derived directly from the seasonal component of a time-series decomposition. Building on recent literature on seasonal feature extraction and seasonal signatures [9], we summarize each destination's recurring annual pattern using five interpretable variables: peak timing, amplitude, number of peaks, shoulder width, and overall seasonal strength. These features characterize not only when and how peaks occur, but also the breadth of elevated demand and the intensity of seasonal swings.

MATERIALS AND METHODS

The seasonality classification starts from a standard seasonal–trend decomposition of each destination's time series. For each destination, we can consider a regularly spaced demand series, for example: the monthly overnight stays, and apply a seasonal–trend

decomposition procedure (e.g., STL or X-13) to separate the series into trend, seasonal, and irregular components. The specific decomposition method is not critical for the taxonomy, provided that it reliably captures recurring within-year variation and delivers an explicit seasonal component for each period.

In contrast, scalar concentration measures such as the Gini index are not appropriate as inputs for this classification, because they do not distinguish between trend and seasonal patterns, and summarize the series into a single value rather than generating an additional series that can be analyzed further.

RESEARCH RESULTS

The rule set assigns each destination a small combination of labels that capture different aspects of its seasonal pattern. At the core are the winter and summer peak labels, which are mutually exclusive by construction: a destination can peak in one broad season or the other, but not both. A third label, dual/multiple peaks, captures destinations with more than one distinct high season, irrespective of whether these occur in summer, winter, or shoulder periods. Because the labels are derived solely from the shape of the seasonal component, and not from the overall level of demand, the classification is comparable across markets of very different sizes. A small niche resort and a large metropolitan destination can share the same seasonal type if their normalized patterns are similar.

In our application, the resulting categories align closely with intuitive patterns that practitioners already recognize. Destinations with a single, sharp summer peak correspond to the stereotypical “beach” pattern, while those with a single winter peak exhibit a “ski” or snow-oriented profile. Dual-peak destinations tend to resemble “mixed offers”—for example, places that attract visitors in both winter and summer for different activities, or city destinations combining business and leisure peaks. Beyond these familiar cases, the taxonomy explicitly identifies two additional, often under-discussed types: destinations with broad shoulder seasons, where demand remains elevated over long transition periods rather than concentrating in a single narrow peak, and destinations with genuinely flat profiles, where seasonal fluctuations are weak relative to the overall level of activity.

The outputs are straightforward to audit and visualize. For each destination, we can display its normalized seasonal curve, the five numerical descriptors, and the assigned set of labels. Seasonal plots such as Figure 1 and Figure 2 illustrate how destinations with different labels cluster into distinguishable shapes, and make it easy to verify that the rule-based classification reflects the underlying patterns rather than artefacts of the algorithm. Because the descriptors are interpretable (timing, amplitude, number of peaks, shoulder width, and seasonal strength), practitioners can also trace back why a destination received a particular label and how small changes in the seasonal pattern would move it across categories. This transparency is particularly important when the classification is applied at scale to hundreds or thousands of series, as it supports both diagnostic checks and substantive interpretation of cross-market differences.

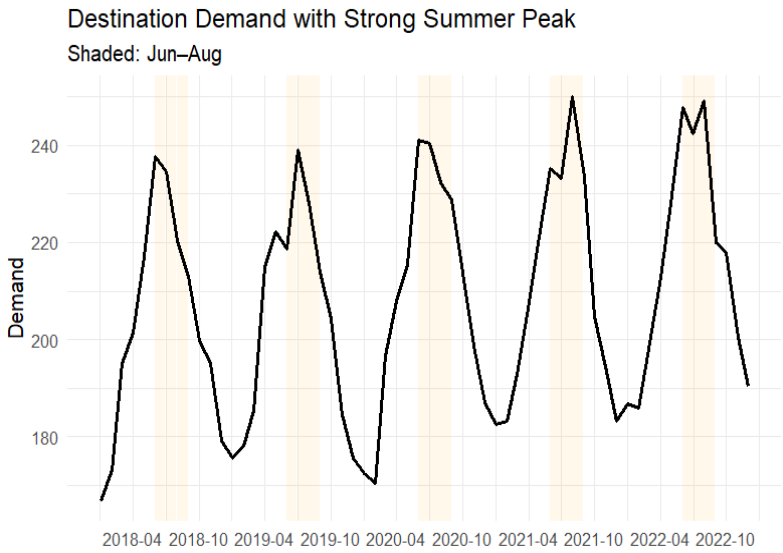

Figure 1. Seasonal plot of a destination with a strong summer peak

Source: Own work, 2025

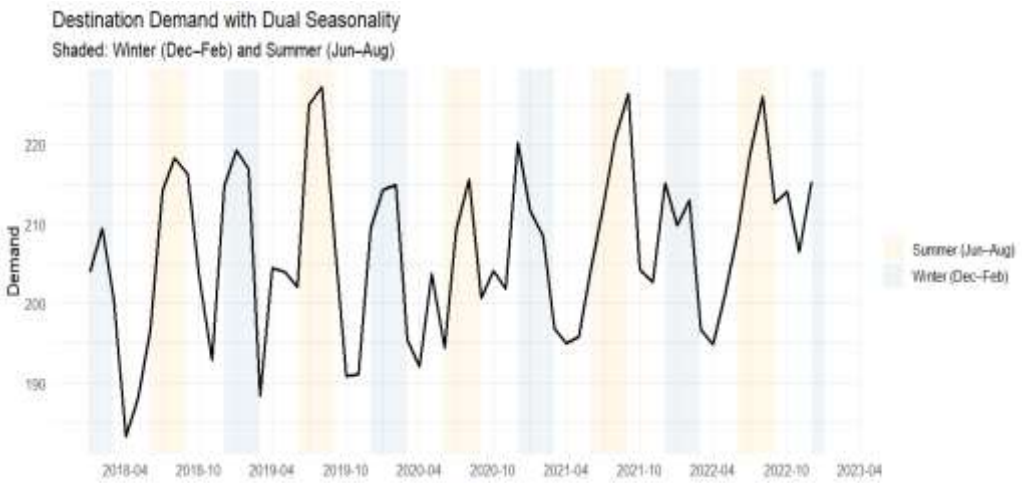

Figure 2. Seasonal plot of a destination with strong dual peaks

Source: Own work, 2025

CONCLUSIONS

This paper proposed a simple, transparent taxonomy for classifying tourism destinations based solely on the seasonal component of their demand. Starting from a standard seasonal–trend decomposition, we summarized each destination's within-year pattern using five interpretable descriptors—peak timing, amplitude, number of peaks, shoulder width, and seasonal strength—and translated these into a small set of intuitive labels. The resulting types (summer vs. winter peak, single vs. dual/multiple peaks, strong vs. weak shoulders, and flat/weak seasonality) can be applied consistently across large numbers of time series, independently of the overall level of demand.

Empirically, the rule-based classification reproduces patterns that practitioners already recognize (e.g., beach, ski, mixed offers) while explicitly identifying two often overlooked cases: destinations with broad shoulder seasons and those with genuinely flat seasonal profiles.

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